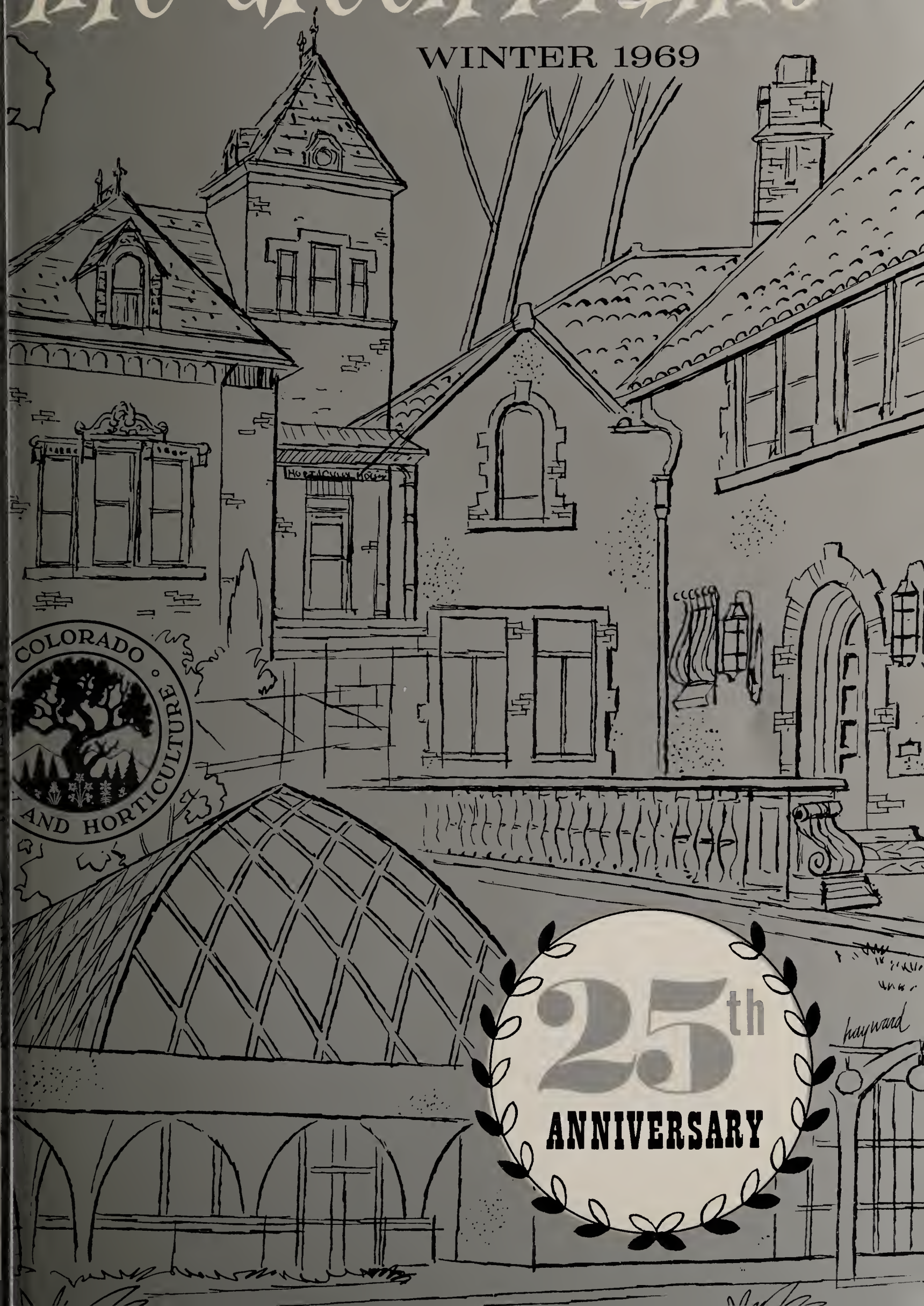


The Green Thumb

WINTER 1969



25th

ANNIVERSARY

THE COVER

TWENTY-FIFTH ANNIVERSARY

Montage by Phil Hayward

THE GREEN THUMB

VOLUME TWENTY-SIX, NUMBER ONE

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The Green Thumb

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DAVID A. BLADES,

DR. HELEN M. ZEINER AND BERNICE E. PETERSEN, *Co-Editors*

WINTER 1969

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By becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the use of the books in the Helen K. Fowler Library at Botanic Gardens House.

For further information write to Membership Chairman, Botanic Gardens House, 909 York Street, Denver, Colo. 80206, or call 297-2547.

THE FIRST TWENTY-FIVE YEARS

ELINOR KINGERY

NOW, TWENTY-FIVE YEARS after *The Green Thumb* first appeared to the members of the newly formed Colorado Forestry and Horticulture Association, George W. Kelly,* its first editor, says of those early days "There was much work, some fun, some disappointments, and great challenges in the work." For twelve years — almost half of the life of the magazine — Mr. Kelly coped with the challenges, did the work, enjoyed the fun and endured the disappointments.

For the five years following, Pat Galavan undertook the challenge; then, with the merging of the Colorado Forestry and Horticulture Association into the Denver Botanic Gardens, Inc., in November of 1960, a succession of editors on the Botanic Gardens staff, and recently, volunteers, have carried on in the same tradition of devoted service.

Dr. A. C. Hildreth, nationally known for his work as Superintendent of the Cheyenne Horticultural Field Station, Director of Denver Botanic Gardens for many years, heads the list. M. Walter Pesman, staunch and knowledgeable supporter of *The Green Thumb* and a founder of Colorado Forestry and Horticulture Association, served pro tem; then came the follow-

ing staff members: Dr. James Feucht, Harley C. Thompson, Dr. Helen Marsh Zeiner (temporary), Joseph W. Oppen, Helen Vincent, and for the last year two dedicated volunteers, Bernice Petersen and Dr. Zeiner, have been co-editors.

In 1954, at Mr. Kelly's request, an editorial committee was formed to assist him in obtaining contributions, topics, authors and artists. The *Green Thumb* Editorial Committee has continued in varying degrees of responsibility throughout the past fourteen years and has, in effect, been the stabilizing factor in the life of the magazine.

IN THE BEGINNING

In 1944 the Colorado State Forestry Association, which dates its beginning in 1884, and the Denver Society of

*As part of the preparation for this article George W. Kelly, first editor of *The Green Thumb*, past executive director of the Colorado Forestry and Horticulture Association and its official horticulturist, was asked to comment on the progress and development of the magazine and his part in it. Mr. Kelly's quotations in this article are taken from his letters. It was because of his dedication and enthusiasm, his instinctive teaching abilities and his talent for instilling enthusiasm in others that the organization was able to establish a magazine of value. Recently he was named "Man of the Year" by the Chamber of Commerce at Cortez, Colorado, his present residence.

Ornamental Horticulture, fathered by S. R. DeBoer in 1916, fused to become the Colorado Forestry and Horticulture Association. The two organizations embraced many of the same people, both served the love of growing things, and they truly foresaw that their combined energies would more than double their effectiveness. At the first meeting of the new Association Mrs. John Evans, largely responsible for its formation, was elected president and continued in that office until 1952.

OBJECTIVES

The very first objective listed in the Program of Activities is the regular publication of a bulletin. Says George Kelly: "I volunteered to edit the magazine when it was first suggested, and the Association was glad to have me do so for a year in my spare time. After the first year I was persuaded to take on the job, full-time.



Mrs. John Evans, First President of Colorado Forestry and Horticulture Association.

"I had given this much thought and had decided that I might do a much needed job of education. I had decided that the nursery and landscape businesses could never find their real place in the community unless the public was educated to appreciate those who really knew horticulture . . . The other part of horticultural education that I worked for was that of the nurseryman and landscaper himself so that he would be worthy of greater respect and profit."

When we analyze the objectives of the Colorado Forestry and Horticulture Association as outlined in the first issue of *The Green Thumb* (reproduced here in its entirety on pages 17 to 24) we see that the Association did conceive of itself as an educational agency with its principal teacher *The Green Thumb*. The president, Mrs. Evans, in her report for 1946 states, "Your board and officers have felt it of *primary* importance to develop in interest and circulation, its bi-monthly publication, *The Green Thumb* . . . Its issues are replete with information of value to all those interested in our objectives." Ten years later in the president's report summing up progress, Fred R. Johnson says that "Perhaps the Association's greatest contribution to our membership is *The Green Thumb*."

CONTRIBUTORS

Its pages could serve as a complete gardening education for this region, and it has kept its readers informed of the other fields of concern to the organization. It has thrived because, as George Kelly writes, of the efforts "of really dedicated people who believed in the purposes"; and because, as Walter Pesman said, "We may well claim that all the local authorities in horticulture, and a number of national experts had a share in making it outstanding." Soil experts, rose growers, iris buffs, evergreen specialists, foresters, nurserymen,



George W. Kelly, first editor; L. C. Shoemaker, office manager; M. Walter Pesman, a founder.

all have devoted time and ability to contribute their expert knowledge. Some of these people are known principally within the state or Rocky Mountain region, since with our growing conditions it is essential that our knowledge be local. Some, like Darwin M. Andrews, collector of native plants and developer of new varieties of iris and lilacs, peonies and phlox, or Robert E. More, experimenter with evergreens, are local men who have become world known. Some, like Dr. William J. Weber, the authority on lichens, Dr. H. D. Harrington, author of the *Manual of the Plants of Colorado*, and Dr. Moras Shubert of the University of Denver, are teachers in our universities.

Some, like Hugh Hammond Bennett the soil conservationist, were already nationally known and have shared their knowledge with *The Green Thumb*.

The list is impressive: Dr. Donald Wyman, Dr. John C. Wister, horticulturists; Edmund Wallace, landscape planner; Ruth Ashton Nelson, authority on wild flowers; Robert Niedrach on birds; Charles M. Drage and J. V. K. Wagar of Colorado State University, as well as many other authorities from that faculty; Dr. Richard G. Beidleman of Colorado College; Colonel Allen S. Peck, Regional Forester for the Rocky Mountain Region; Leonard C. Shoemaker, H. N. Wheeler, W. A. Kreutzer and other members of the Forest Serv.

ce; William H. Lucking, J. D. and Everett Long, nurserymen, who have experimented and developed specialties, and many other nurserymen with special knowledge; S. R. DeBoer, M. Walter Pesman, Katharine B. Crisp, Mark and Claire Norton, Clyde Learned, Kathleen Marriage, Kathryn Kalmbach, Myrtle Ross Davis, Lenoine Bechtold, Herbert Gundell, Dr. E. H. Brunquist, Dr. B. O. Longyear — hardly a person whose name would be familiar to plant lovers of this area is missing from our authors.

With such a collection of authors, and with the enthusiasm which has characterized involvement with *The Green Thumb*, it is not surprising that *The Green Thumb* evolved as an outstanding magazine of its type, and received awards and praise from horticulturists in other parts of the nation.

Modern trends (or are they sometimes fads?) — climate control, organic gardening, hydroponics, growing plants under artificial light — all have their way of revelation for readers of *The Green Thumb*, as has the lighter side of some of our most authoritative contributors: note Dr. A. C. Hildreth's comments on coffins, the essays by Dr. Fred Zeiner, the lively arguments between "Quercus" and "John Stockbridge."

SPECIAL ISSUES

Almost immediately after the organization of the new association, *The Green Thumb* furnished the means for carrying out the second objective listed in the Program of Activities — the publication of educational leaflets. The whole second issue was a Victory Garden Manual, detailing month by month what should be done in the amateur vegetable garden and how to do it. (This was the time of the war, remember.) It was good advertising, too. Ten thousand copies were printed

and distributed free through the public schools, the Boy Scouts, and other organizations.

From time to time other issues were reserved for special subjects — lilacs in December of 1944 (this issue initiated the use of color in the magazine), roses in April of 1954, the lawn issue in August of the same year; soils, 1955. While special leaflets aside from *The Green Thumb* were never published for general distribution, the purpose of this second provision was certainly carried out through these special issues, through articles on plants for different purposes — hedges, shrubs, shade trees — truly earning for the Association its designation of "Colorado" in the particular attention given to various parts of the State. Many of these articles were reprinted and distributed separately.

Even before that fortuitous joining of the two organizations — the Colorado State Forestry Association and the Denver Society of Ornamental Horticulture — in 1944 to form the Colorado Forestry and Horticulture Association, interest in the establishment of a botanic garden was evident. We could believe the idea went back to the first man who planted the first tree here and said "Gee, I hope it grows!" (Most likely, considering our climate, it didn't.) Certain it is that by 1861 William N. Byers, editor of the *Rocky Mountain News*, was attempting to form an Agricultural Society, and in 1881 he read a paper which presented his problems and conclusions on growing shade trees in Denver. But the resolution passed at the 1914 meeting of the Colorado State Forestry Association looking towards an arboretum in City Park is the first organized interest of which we have knowledge. It persisted and grew, and in 1941 we find in the proceedings of the Forestry As-

sociation another resolution, long and detailed, calling for a botanical garden in or near Denver. In the 1944 Program of Activities, immediately after instituting the all-important bulletin — the means of reaching its members — even before proposing an office, came the promotion of a Rocky Mountain Botanic Garden. How can words convey the dedication, the effort, the thought, the selfless devotion on the part of those early members which has made the Denver Botanic Gardens a reality? Mrs. John Evans, the Association's first president, S. R. DeBoer, who at her request drew master plans for the City Park Gardens and never ceased to work for them, Mrs. George Garrey, Robert E. More, M. Walter Pesman, Fred R. Johnson — it was never far from the thoughts of any of them. In *The Green Thumb* George Kelly and, later, Pat Gallavan lost no opportunity, directly and indirectly, to inform and interest the membership. Finally, in the February 1953 issue of *The Green Thumb*, Mrs. Evans, past

president of the Colorado Forestry and Horticulture Association and president of the Botanical Gardens Foundation of Denver, Inc., announced the City's acceptance of the Master Plan prepared by Mr. DeBoer and the imminent beginning of its implementation in City Park.

The interest of the Colorado Forestry and Horticulture Association in the development of the Botanic Garden did not flag but continued to be of prime concern until the absorption of the Association by the Botanic Gardens in 1960, and *The Green Thumb* reflected that concern in its regular publication of articles on the Denver Gardens and botanical gardens in other places, for *The Green Thumb* has been the dominant continuing factor between the merged organizations.

On the way toward the realization of our Botanic Gardens in Denver, the foresight of the 1914 resolution of the old Forestry Association in providing for the acquisition or dedication of "many small tracts" for special pur



Presidents Lawrence A. Long and Scott Wilmore discuss the merger documents.

poses was evidenced by the reservation of three tracts near Colorado Springs in 1947 for oneseed junipers, for white firs, and for yuccas; by the dedication of the Colorado Silver Cedar Botanical Reserve in the Denver Mountain Parks in 1948; in the M. J. Webber Botanical Reserve at the Broadview Nursery near Denver in 1949. What has become of these reserves? In the same tradition but actively used is the Mt. Goliath Alpine Garden unit of the Denver Botanic Gardens with its M. Walter Pesman trail, whose establishment in cooperation with the Forest Service is entirely due to the devoted efforts of Green Thumb members.

HORTICULTURE HOUSE

Only fourth on the list of activities was the establishment of an office or headquarters, although without such a focus for its varied program the new organization was footless. Mrs. George Garrey, active then in the Horticulture Association as now in the Botanic Gardens, says "Having an office was a very potent factor in getting this thing started."

Until the end of 1944, the address of the Association was the same as that of the Editor of *The Green Thumb* and part-time executive, George W. Kelly. Then for a little more than two years the Association was given space in the office of Irvin McCrary, one of the Board members, at Sixteenth and Broadway. Mrs. Evans, President, saw the inadequacy of this arrangement and gave to the Association the use of that charming Victorian house at 1355 Bannock Street, remodeled and furnished to meet the Association's needs. This was headquarters until its demolition in 1959, when the Association's headquarters was transferred to Botanic Gardens House. This new office also was made possible through the help of a generous-hearted woman,

Mrs. James J. Waring, who had given the house to the Botanic Gardens.

With the establishment of Horticulture House came the Helen Fowler Library and the Kathryn Kalmbach Herbarium. This regional horticultural library has, according to George Kelly, "been rather well done." It has been moved, as has the Herbarium, to Botanic Gardens House, where both are available to those perceptive enough to take advantage of them.

ROADSIDE DEVELOPMENT

In the January 1950 issue of *The Green Thumb* Carl Feiss, chairman of the Association's Committee on Roadside Improvement and State Parks, Director of the School of Architecture and Planning of the University of Denver, reports "we have almost no roadside parks or camp sites." The Roadside Development Committee was revived in 1954 under the chairmanship of M. Walter Pesman, to include Clyde Learned of the U.S. Bureau of Public



Mrs. James J. Waring, Donor of Botanic Gardens House.

Roads, Harold Lathrop of the Recreation Association, Charles Shumate of the State Highway Department, Mrs. Frank E. Neal of the Blue Star Highway Association, as well as other people of varied interests. While the lay members of the Committee certainly learned from these officials of the problems of roadside parks, it is only reasonable to suppose that the officials also learned from the Horticulture Association of the public demand and its idea of the importance of these pleasant roadside conveniences. By 1958 an Advisory Committee on State Waysides was appointed by the chairman of the Colorado State Park and Recreation Board (an agency of the State). Everyone on this Committee excepting possibly one member, was a devoted member of The Colorado Forestry and Horticulture Association. These activities were reported in *The Green Thumb*.

To quote George Kelly: "At times it has seemed that little along this line has been done, yet when we compare the present attitudes of highway officials with that of ones at the start of *The Green Thumb*, we cannot help but believe that we helped to spark the new attitude toward highway beautification."

The objectives in the sixth article of the Program of Activities may be called, in general, "education," or, rather, "formal instruction," since the focus on all activities of the Association has been education. We cannot claim that either the Association or the magazine has done much to further nature and conservation training in the schools. But in line with the sixth objective is the announcement in the January 1947 issue of a free landscaping school primarily for returned veterans. Too, emphasis was laid on trying to interest children in gardening and in teaching them. This has been carried on in the



"Education." Dr. A. C. Hildreth gives expert advice in Children's Garden Program.

most practical way by the Botanic Gardens through the children's garden program.

Classes in landscape planting for Denver homes, including design and materials, were announced in April of 1948; classes for commercial gardeners in 1949; a Nature Leaders' Institute in 1950; neighborhood gardening classes in 1953, and so on through the years. In addition, *The Green Thumb* radio programs were broadcast weekly for years by George Kelly and later by Pat Gallavan, the thousands of questions answered, the talks and lectures — which reached a combined audience of 6000 persons in one year — have provided a little of the yeast which, hopefully, will eventually leaven the lump.

On item seven — the improvement of Colorado cities through adequate parks, shade trees on streets, landscaping grounds around public buildings — we can do no better than to quote George Kelly's remarks on this subject: "There has been much improvement in the general attitude towards such things. How much credit goes to the G. T. and how much to Lady Bird is hard to determine."

In the President's report for 1953, Fred R. Johnson states: "As a result, largely of the work of the Association's committee on State Parks . . . we now have a State Park Advisory Council . . . appointed by the State Land Board." In 1955 and 1957 the State Legislature provided for a Park and Recreation Board; by December of 1957, Harold W. Lathrop had been appointed Director of the agency. The legislature of 1963 merged the Park and Recreation Board with the Fish and Game Department.

Although Colorado still lags far behind other states in providing State Parks, as well as roadside parks and

parkways, when the Association began its campaign, Colorado had none. At present it has two Parks — Lathrop State Park near Walsenburg and Golden Gate State Park in Golden Gate Canyon — and 32 recreation areas.

CONSERVATION

"Colorado was the first state in the Union to include a provision in her constitution for the protection of forested lands, and organized the second forestry association in the United States. This association was originally known as the Colorado State Forestry Association" (*The Green Thumb*, April 1959, p. 101). Naturally, with such a background, *The Green Thumb* was concerned with the state's forests. Throughout the years it published articles on the preservation of forest lands, on conditions in the national forests, on proper Christmas tree cutting; the Association also sent representatives to hearings on forestry legislation. But we have no record of great accomplishment.

Conservation, or a "civic consciousness," as the Program of Activities calls it, of the value of preserving forests, natural scenic areas, unique natural areas, typical natural areas, wilderness, soil — the wise use of natural resources, has been defined as a way of looking at things which affects, and is affected by, practically all human activities. Certainly an organization such as the Botanic Gardens; such as its predecessor, the Colorado Forestry and Horticulture Association, and its predecessors; such a publication as *The Green Thumb*, devoted to the cultivation of growing things; all of these must, by their very nature, be imbued with this way of looking at the world. And this attitude is reflected in the pages of *The Green Thumb*. They report the fight against the Echo Park

Dam, the struggle for the Great Plains National Monument, the concern over the Wilderness Bill, the accomplishments of the Soil Conservation Service. They also harp on the simpler, everyday things each person should do to help keep the natural beauty that is ours — *Don't Be A Litter Bug, Save the Wildflowers*, etc. Education, always education! Education of ourselves, our members, education of our lawmakers and governors, is carried on by articles, by the work of committees, and reported.

George Kelly writes: "*The Green Thumb's* influence here has been a little vague, but certainly some of the early stories about conservation must have had some effect in the increased interest in these things . . . In our campaign for the preservation of the Dinosaur Monument, we were directly responsible for calling attention to the need of united action which resulted in the allying of various conservation organizations."

A legislative committee was appointed by the Colorado Forestry and Horticulture Association in the beginning, as suggested in Program Item 11, and was listed for years in the directory at the front of *The Green Thumb*. Its activities are very seldom mentioned. But as the other divisions of the program often overlap to form a homogeneous whole, so activities in regard to legislation, or the attempt to influence legislation or administrative bodies of the government were undertaken by the other committees or in conjunction with them. The State Parks Board, the Waysides, conservation, even the very establishment of the Denver Botanic Gardens — little could have been accomplished for these causes without acting through government. Our legislative committee has been active in spite of itself!

Rounding out the dozen objectives or activities of the fledgling association was the institute — according to the dictionary an organization for the promotion of learning — to be held annually. Conferences and meetings formal enough to be called "institutes" have been held through the years, not annually excepting at first, and not always fully reported in *The Green Thumb*. Some have been general, some on special subjects, but all have been "for the promotion of learning." All are a part of the pattern of education carried on by *The Green Thumb*, the Colorado Forestry and Horticulture Association, and the Denver Botanic Gardens — the education particularly necessary in this area where horticulture is different.

In 1944 at the beginning of the Colorado Forestry and Horticulture Association, Kathryn Kalmbach quotes Aven Nelson, the pioneer Rocky Mountain botanist, as saying "I discovered, as doubtless some of you have, that in the absence of knowledge, enthusiasm will do much to cover up the deficiency." Plants, though, seem to prefer zeal according to knowledge. *The Green Thumb*, though it has shifted in emphasis away from forestry to horticulture and now, hopefully, toward botany still disseminates that knowledge. In 1960, as the magazine was transferred to the direction of the Denver Botanic Gardens, Walter Pesman in summing up says "*The Green Thumb* has been in the forefront of horticultural education of the region. It is my dream that it will grow in stature and significance in the same proportion as the growth of population." Now, at the beginning of the second quarter century of its existence, after eight years under the aegis of the Denver Botanic Gardens — the fulfilled hope of its founders — we dream the same dream.

Don Bol 74

THE ANCIENT ALLIUMS

EVELYN F. JOHNSON

Gardeners are becoming increasingly aware of the decorative value of the alliums, perhaps better known as flowering onions. Their unusual form and size of the heads of bloom and height of the flowering stems make these onions stand out in an extraordinary fashion in the garden. They have a long blooming season, and as an additional bonus the flowers are followed by ornamental seed heads, decorative for another long period.

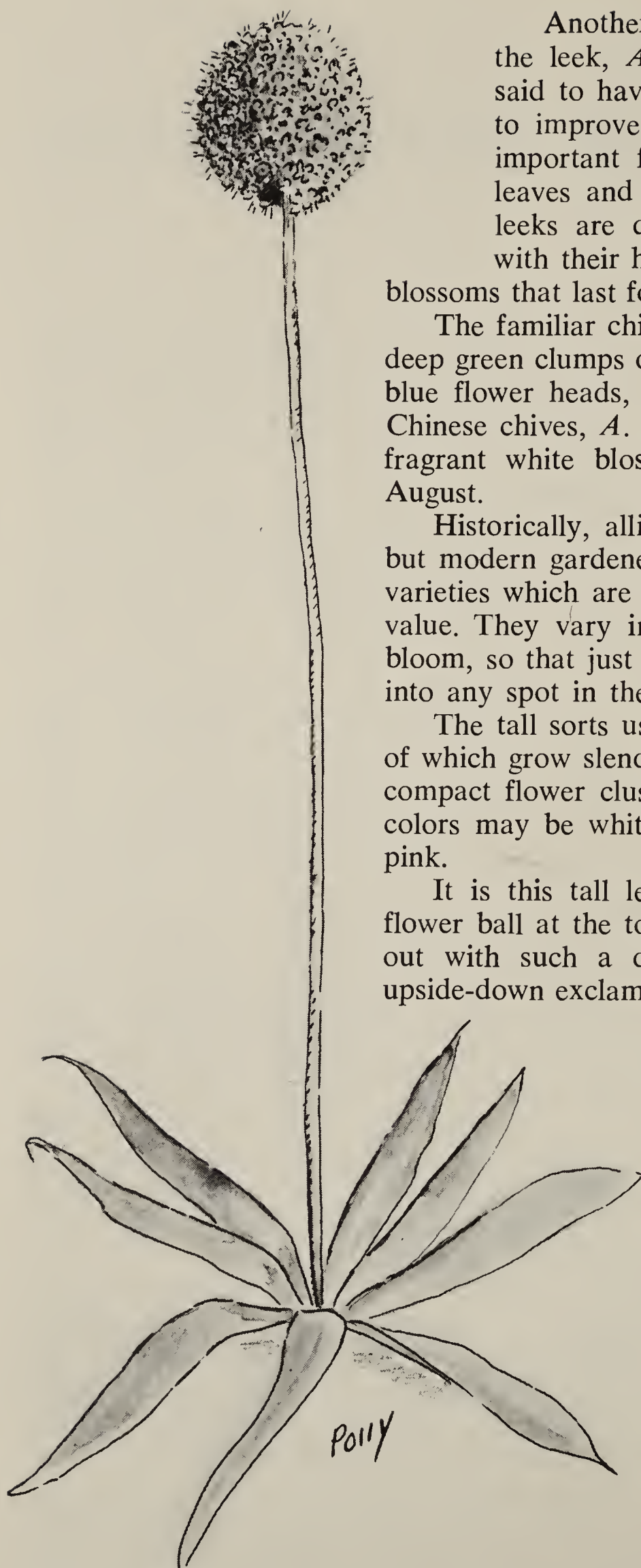
The onions make up a large genus of plants. Over 500 varieties are known. They have played an important role in the life of mankind and have been mentioned by most of the ancient historians. A great many varieties originally came from Asiatic countries, where for centuries they have been grown as an important food. They also have been considered to have great medicinal value. They even have had religious significance. Some of the ancient inhabitants of

Egypt worshiped the onion and were not allowed to use it as food. Pliny, the Roman historian, tells us that the Egyptians invoked the onion in taking an oath.

Leeks, onions, and garlic are mentioned in the Bible. We are told that when Moses was leading the Israelites out of Egypt they complained bitterly to him, saying: "We remember the fish which we did eat in Egypt freely; the cucumbers and the melons, and the leeks, and the Onions and the garlic. But now — there is nothing at all but this manna."

The Greek historian Herodotus wrote that it took 9 tons of gold to pay for the "pungent onions" required to feed the slave workers who built the pyramids. These were the Egyptian multiplier onions, *Cepa viviparum*, which may not be known to modern gardeners, although they can be found growing in our area. I remember seeing them in my childhood in a garden in eastern Colorado — brought there by early settlers from the East, along with cabbage rose, tansy, ribbon grass and other old-fashioned plants.

This Egyptian onion produces little green bulblets at the *top* of leafless flowering stems instead of blossoms. It is unusual and attractive growing at the back of the perennial border with its bouquets of little green onions (bulblets) in early spring. Culture is the same as the ordinary green garden variety.



Another allium with an old history is the leek, *Allium porrum*. Emperor Nero is said to have eaten leeks three times a week to improve his singing voice. Leeks are an important food in Asia and Europe where leaves and stems are made into stews. The leeks are quite ornamental in our gardens with their huge white or sometimes lavender blossoms that last for weeks in midsummer.

The familiar chives, *Allium schoenoprasem*, with deep green clumps of grass-like foliage and lavender-blue flower heads, makes an attractive low border. Chinese chives, *A. tuberosum*, has wider leaves and fragrant white blossoms. Both bloom in July and August.

Historically, alliums have been grown for food, but modern gardeners now have an extensive list of varieties which are planted only for their decorative value. They vary in appearance, size, and time of bloom, so that just the right one can be found to fit into any spot in the garden.

The tall sorts usually have wide basal leaves out of which grow slender leafless stems topped by huge compact flower clusters resembling floral balls. The colors may be white, shades of purple, lavender or pink.

It is this tall leafless stem (or scape) with its flower ball at the top which makes the allium stand out with such a dramatic effect — much like an upside-down exclamation point. At any rate the sight of these extraordinary blossoms causes many exclamations.

Some of the dwarf kinds can have wide leaves, but most of them make clumps of narrow grass-like foliage. All carry their ball-shaped blossom heads on characteristic leafless stems.

Alliums grow from bulbs, and most varieties are as hardy as tulips; like tulips they should be planted in the fall. They need only an ordinary well-drained soil in either sun or very light

shade. Fortunately, the more expensive varieties are quite effective planted singly among other perennials or in groups of two or three. The smaller, more

dainty sorts are better planted several in a group. These look well at the edge of a border or in the rock garden.

A list of about twenty of the decorative varieties can be found in some bulb catalogues. *Allium rosenbachianum*, one of the earliest to appear in spring, produces a rose-purple compact ball in late May. June-blooming *A. aflatunense* is similar, but taller and deep violet in color.

Perhaps the most spectacular variety is *Allium giganteum*, a huge bulb from Tibet, which has been named Jewel of Tibet here in America. It has a 5 or 6 foot bloom stalk with an enormous deep lavender ball.

One of the most unusual and popular varieties is *Allium albopilosum*, called Stars of Persia — a very apt name. The flower head looks like a bursting sky-rocket of silver-lilac stars. Even the dried seed cluster retains this appearance.

Among the dwarfs, one of the brightest is *Allium moly*, golden garlic. It should be planted in groups in the border or rock garden. *A. ostrowskianum* makes beautiful rose-colored drifts, and one of the loveliest of all is *A. azureum*, the blue garlic, with its clear blue brilliance.

Allium sphaerocephalum has a wine-colored cone-shaped ball. *A. karataviense* is an eye-catcher in spring, with its three wide, blue-green leaves edged with red that lie close to the ground. A gray-pink ball rises to 10 or 15 inches.

One of the latest to bloom is *Allium triquetrum*, appearing in August and September. It has three-cornered stems and small white clusters of flowers striped with green.

In addition to their spectacular displays in the garden, alliums provide outstanding material for the flower arranger, either when freshly cut or when dried for winter arrangements. The dried seed heads can be used in their natural fall colors or sprayed gold or silver.

Alliums' one drawback that might keep some gardeners from planting them is that all are onions and have the characteristic scent of onions. This, however, is not particularly noticeable unless the plants are touched. For most people their unusual and extraordinary decorative value far outweighs this characteristic. More and more gardeners are discovering these magnificent plants and using them.

Seed head of *Allium albopilosum*, Stars of Persia.



FOCUS

on

Coffea Arabica

in the

Boettcher Memorial Conservatory

PEG HAYWARD

The early history concerning the discovery and dispersion of the economically important coffee tree is one of the most interesting and romantic that any crop can boast. The origin of the coffee habit remains elusive despite the fact that people over about one-third of the world agree that a cup of coffee is the best nonalcoholic beverage to be had.

There are over 60 species of *Coffea*. However, the best quality coffee is produced from *Coffea arabica*, a genus of the *Rubiaceae* family. In spite of the species name, *arabica*, this plant probably originated in Ethiopia. The name, *Coffea*, comes from Kaffa, which is the old name for a mountainous region of southwestern Ethiopia. One of the old legends about the discovery of coffee and man's use of it as a beverage is that an Ethiopian shepherd found his goats dancing and cavorting after eating the fruits and branch-tips of a certain bush. The shepherd was curious and tested the fruits one day. He was so refreshed and stimulated that he danced along with his goats. Ethiopians still gather coffee from wild-growing trees, and many of them make a drink from the dried leaves as well as from the berries.



Coffea arabica

Arab traders carried the beans and later the plants into most of the Moslem world, making coffee-drinking an Arabian custom despite initial conflict with orthodox conservatives who claimed the beverage to be intoxicating and hence prohibited to Moslems by the Koran. The exact progress of events is unknown. However, the domestication of Arabian coffee developed during the fifteenth and sixteenth centuries from the mere chewing of the dried seeds and fruits to the brewing of beverages

from the ripe fruit and possibly from the roasted coffee beans. In Arabia the use of coffee as a beverage was soon preferred to an infusion formerly made from the leaves of *Catha edulis*, Arabian tea. The coffee-drinking habit spread during the sixteenth and seventeenth centuries into European countries. Coffee houses became popular as meeting places and news centers in England in 1652 and in eastern cities of North America by 1698.

Until about 1700, Arabia provided most of the coffee. As the demand for coffee grew, plantations extended into Ceylon, Java, West Indies, and by 1774 the first coffee plants were grown in southern Brazil. Now Brazil grows more than half the world's supply of coffee.

Coffea arabica bears glossy evergreen, opposite leaves. The tree grows as regular as a spruce tree, with lateral branches in horizontal pairs. The tree ranges from 10 to 20 feet in height, although in cultivation it is trimmed back for easy picking. The fragrant, pure white, star-shaped flowers burst forth into bloom in clusters of one to

four. Each flower has five petals and rarely blooms for more than a day. At the base of the blossom the dark green berry develops. When mature it is half an inch in diameter and ripens over a period of 7 to 9 months to deep red. The tree often bears flowers, unripe and ripe fruit at the same time. Each ripe red berry contains two coffee beans or seeds.

Skilled pickers harvest the ripe berries by hand, gathering about 125 pounds of "cherries" daily. This yields about 25 pounds of saleable coffee beans when roasted. The picked berries are put through a bath of running water and then the pulp is removed. The beans are then dried and left to cure for several weeks after which they are hulled, peeled, and sorted. The coffee beans are shipped to companies which roast and package the coffee in the country where it is to be sold.

Coffea arabica and several of its close relatives, which are well known ornamentals, including the brilliant flowering *Ixoras* and the fragrant *Gardenias*, may be seen in Boettcher Conservatory of the Denver Botanic Gardens.

THE LIGHTER SIDE—

These verses by JOHN STOCKBRIDGE are reprinted from early issues of *The Green Thumb*.

An earthworm saw another worm
A-writhing on the ground.
Said he, "My Darling, marry me,
Oh, sweetest thing I've found!"
She said, "No, that can never be,
I'll have to be your friend;
Because you dope, now can't you see,
I'm just your other end?"

◇ ◇ ◇ ◇ ◇

The more I plant, the more I hoe
The more I spray — the less I know.

The dandelions in our lawn
Grow prettily and brightly.
But those our next-door neighbor has
Are really most unsightly.

◇ ◇ ◇ ◇ ◇

I wish I were a compost heap
Neglected and forgotten;
My value to the world I'd keep,
Altho my life were rotten.

◇ ◇ ◇ ◇ ◇

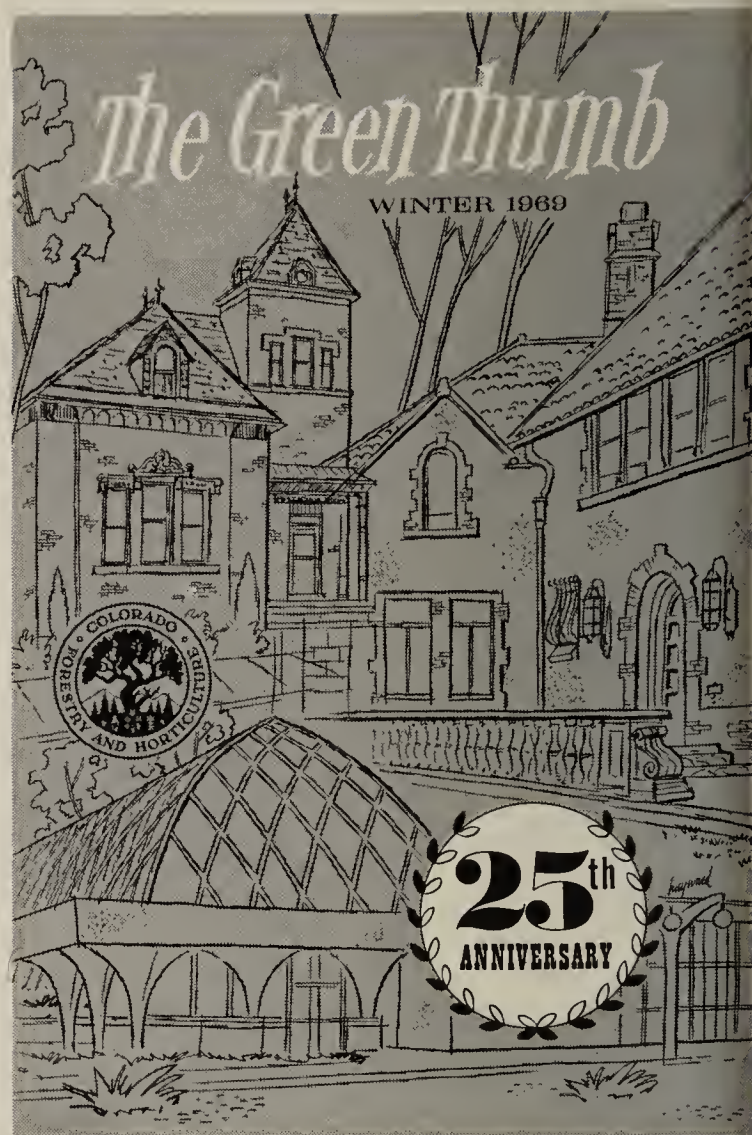
Early to bed, early to rise
Work like the devil — and fertilize!

Our ANNIVERSARY ISSUE

Our Twenty-Fifth Anniversary cover, a montage by Phil Hayward, portrays important stages in the life of *The Green Thumb* magazine. The magazine was founded in February 1944 as the voice of Colorado Forestry and Horticulture Association. This founding is represented here by the Association's insignia. Designed by Mr. and Mrs. Claude Hansen, the insignia was introduced to the membership on the magazine's cover in February 1949. It decorated the back cover for many years and moved up front in 1955 where it remained as the publication's only ornamentation until 1959. Although the format was changed, the insignia (in smaller form) retained an important place on the cover until the magazine became the official organ of Denver Botanic Gardens late in 1960.

Horticulture House, with its quaint Victorian architecture, was home for the magazine until 1959 when the Association moved to its pleasant headquarters in Botanic Gardens House. The addition of Boettcher Memorial Conservatory to the Gardens afforded another significant change in the format of the magazine. Since *The Green Thumb Conservatory Plant Guide* was published in May 1966, illustrated articles on plants of particular interest in the Conservatory have appeared regularly.

It is the hope of the Green Thumb Editorial Committee that our readers, either recent or confirmed, will enjoy these recollections: the cover by Mr. Hayward; Volume 1, Number 1 of *The Green Thumb* reprinted here; a his-

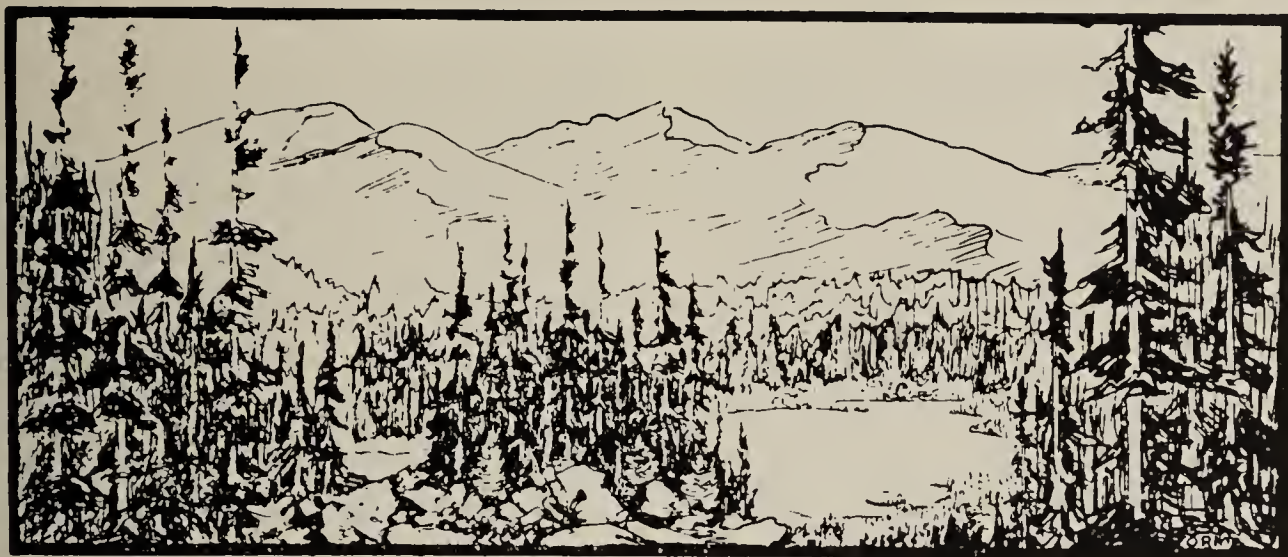


tory, "The First Twenty-Five Years" by Elinor Kingery; a reprint, "The Best Evergreens for Horticultural Use in the Rocky Mountains," by Robert E. More, representing information valuable for this area and found only in *The Green Thumb*; and in "Exotics" Dr. Helen Zeiner considers *Jasminum nudiflorum*, a memorable shrub which grew on the Horticulture House grounds.

Although money was not available to publish a 25-year index, a card index is being prepared by Suzanne Ash and will be ready for use in early spring at the Helen Fowler Library. BEP

Announcing New Editor

With this issue, David A. Blades, Assistant Conservatory Superintendent, joins the editorial staff of *The Green Thumb*. He will assume the editorship of the magazine with the Spring Issue.



THE GREEN THUMB

VOLUME 1, NUMBER 1

FEBRUARY - 1944

GREETINGS

We take pleasure in announcing herewith the arrival of our new publication, tentatively named *The Green Thumb*. It is meant to be a concise and practical source of information for Members of the new Colorado Forestry and Horticulture Association. New developments in gardening and forestry occur over night; we hope to share them with our readers. Especially stressed will be information that fits conditions of this Rocky Mountain Region. We need your co-operation.

THE BOARD OF DIRECTORS,
M. WALTER PESMAN, *President*.

ANNOUNCING THE FORMATION OF THE COLORADO FORESTRY AND HORTICULTURE ASSOCIATION

Many types of organizations in Colorado have the same general basic interest in horticulture and in nature. How to unite them into one group and to serve them adequately has been the problem.

The directors of the Colorado Forestry Association are recommending a broadening of the association for this purpose. Members will receive, at regular intervals, a bulletin similar to this one with interesting and up-to-date information.

It is proposed to hold at least annually a conference similar to those that have proved so successful in the nursery and florist associations. Distinguished scholars from sister States and recognized local authorities will give that type of practical information which every nurseryman, every florist, every gardener and every plant lover craves. The annual meeting will be held in connection with such a conference.

Continued on Page Two

Our first conference will be held on Saturday, February 26, 1944, at Humphrey's Memorial Auditorium, 16th and Lincoln. Details as to membership, etc., will be announced. The annual dues will be small. In order that you may be acquainted with the purposes of this association and the first program, we now quote excerpts from the **program of activities** that has been drafted for the new association, and the program that will be presented on February 26, 1944.

Program of Activities

1. Publication of a monthly or bi-monthly bulletin or news letter to members. This may include, among other things, practical hints on planting and cultivation; notes on interesting and new or little-planted varieties, including native plants; notes on pest and disease control; news items on current activities of the association and digests of committee reports; interesting news within our field of activity from other localities.

2. Publication of a number of educational leaflets on subjects in our field which would fill a popular need in this region. For example, an eight-page leaflet on street-tree planting would be extremely useful in many small communities, and could be furnished free to members and at cost of publication to civic organizations, garden clubs, and interested individuals other than members.

3. Take the initiative in promoting a Rocky Mountain Botanic Garden. This project has had the consideration of the Association for so many years that there is no necessity here to stress its importance. The ideal

arrangement would seem to be to have the City of Denver furnish the site and police the grounds as a unit in the city's park system, with the management of the institution in the hands of an independent organization, presumably with participation of one of the Universities.

4. Establish an office as headquarters of the Association and employ an executive on a part-time basis in order to give the needed continuity and drive to our activities.

5. Urge the resumption of the roadside development program on State highways at the earliest practicable moment. This work was interrupted at the beginning of the war. Public officials should be advised of the interest of such citizens' organizations as ours.

6. Investigate what preparations are being made for instruction and training in forestry and horticulture, or what training is already available, for ex-service-men and others who may wish to prepare themselves for work in this field. Cooperate with school authorities in extending such opportunities for education. Encourage the coordination of academic work with seasonal opportunities for practical work in nurseries, etc. Work for adoption in public school curricula of more nature study and elementary instruction in principles of conservation, with the object of creating in the younger generation an appreciation of forests, parks and plant life, and the need of conserving our natural resources.

7. Stimulate interest on the part of towns and cities to acquire and improve parks and

forests, plant street trees, and improve the grounds of schools and other public buildings, in formulating postwar improvement plans. Suggested cooperating agencies include women's clubs, junior chambers of commerce, Colorado Municipal League, county extension agents, State and county foresters. Leaflets on particular subjects, described in Item 2 above, should be useful in any concerted effort of this sort. In case there is a need after the war to take up the slack in employment by speeding up public work projects, it would be even more important that attention be called to the desirability of civic improvements of the type mentioned.

8. Make a study of the need for a system of State parks in Colorado. In recent years State parks have had a remarkable growth in many eastern and mid-western States and in California, and are also showing up in a number of our neighboring States. They are filling a need for recreation and for preserving places of historic or scientific interest which for one reason or another are unlikely ever to come under the control of the Forest Service or National Park Service. It is not presumed that this Association could do all the work required in securing action to establish a State park system, but an active committee could at least explore the general possibilities and needs. Considerable valuable information on this subject has already been assembled which would be immediately available in starting such a committee to work.

9. Formulate policies with regard to the extension of public forests in Colorado and the regulation of privately-owned forest lands. There are reports of localities where destructive practices in forestry or neglect are increasing erosion, danger from floods, effecting public water supplies and ruining fishing streams. Some of these problem areas are close to home, such as the foothill country near Denver and the Black Forest.

10. Strive to develop in all parts of the State a civic consciousness to work for the preservation of places of natural beauty and prevent wanton destruction of trees and other native growth. At the same time stimulate the planting of trees on privately-owned land, particularly on so-called waste lands along streams and other places favorable to growth. Even though such activity may be a special province of the Agricultural Extension Service and State Forester, can not this Association, as a citizens' organization, be of assistance?

11. Appoint a committee on legislation, to keep an eye on measures which might help or hinder the objectives of the Association and to report on its findings with a view to appropriate action by the Association.

12. Hold an annual institute.

A stamped addressed postcard is enclosed herewith. We request that you answer the questions thereon, sign it and drop it in the mails as soon as possible.

THE COLORADO LANDSCAPE

On the barren mountain slopes of Northern England and in their valleys the Scotch grow to be the sturdiest race of Western Europe. In the valleys of the Alps the sturdy Swiss maintained their democracy for centuries. The mountains and Fjords of Norway produced the hardy seafaring and mountain race of that country. Could it be that on the slopes of the Rockies and in their valleys will develop the sturdiest race of America? Who knows? Certainly sturdy races do not grow in tropical lands with sultry climates, nor on the rich seashore lands where the battle with nature requires no strength.

This is mere speculation. It does seem, however, that in this Rocky Mountain land a type of plant life has found a home which is sturdy enough to withstand the chills of winter and the wither of drouth. It seems, to me at least, that nature is adjusting its plant children here, with reduced spending facilities in a smaller leaf surface and with a greater sturdiness for work in its greater root activity. As time goes on, these qualities will become valuable assets in the commercial growing of plants and the Rocky Mountain land will fill an important place in furnishing the nation with sturdier trees and plants. It is already doing it with such plants as sugar beets, melons, celery, carnations, wheat and many other items.

The narrow valleys of Colorado have a type of landscape which is the opposite of the broad plains and level landscapes

of other parts of the nation. Add to this a type of plant life which is typically Rocky Mountain in character and you have what I believe is the present and the future of the Colorado Landscape. It is different. It dares the man from other states to understand it, to work with it successfully. Landscape and landscape design in this section must be understood to succeed. It requires not only intensive study of the region's plants, its climate, its ways of plant maintenance, but it needs more than that; it requires an understanding of the Landscape of the Rockies. It can be taught nowhere but here.

S. R. De BOER,
Landscape Architect.

Now is a good time to do what trimming or pruning is needed on your fruit or shade trees for several reasons; you are likely to have more time now, and the new growth will soon start and heal over places where cuts are made. Leave maples, walnut and birch alone until they are in leaf, as cuts made in them do not heal until growth starts and they lose much stored-up food when the sap drips out in spring.

It would be well for all of us to watch closely our Colorado Cedar (*Juniperus scopulorum*) this year for indications of the presence of the juniper aphid. They may be present early or late, and it does not take long for them to do a great deal of damage. A contact spray will control them, or a hard force of water from the hose will discourage them and help to correct other trouble that the tree might have.



THE ONESEED JUNIPER IS A WORTHWHILE NATIVE

The Oneseed Juniper, or Cherrystone Juniper (*Juniperus monosperma*), has, as would be expected from its name, normally but one seed in each berry. It is usually broadly conical, as in the illustration, but frequently has many stems and resembles a bush more than it does the conventional tree with a single stem. Although the tree is native to the southern part of Colorado, it is thoroughly hardy any place in the state, is drought-resisting and seems to be much less susceptible to pests than the more frequently used Rocky Mountain Juniper (*Juniperus scopulorum*). The Oneseed Juniper lends itself to shearing and for that reason can be utilized for a hedge. Because of its irregular, spreading shape, it lends itself to naturalistic plantings and other informal uses. Although it will eventually reach a height of 15 or 20 feet, it is somewhat slower growing than the other erect Junipers and for that reason does not get "out of hand" as quickly.

This valuable native plant is available at many Denver nurseries and should be employed more frequently than it is in home planting.

PROPER TIME TO START AN ARBORETUM

Here is the story of two brand-new arboretums, started at a time "when it couldn't be done." One is a small private arboretum, the forty-five acre Desmond Arboretum near Newburgh, New York—the other a pretentious 267-acre public arboretum, located in Seattle, and called the University of Washington Arboretum.

The plans for the Washington Arboretum were drawn in March 1936; in a way it is a "depression-child," the Works Progress Administration furnishing \$800,000 as a relief measure. The Desmond Arboretum was not really started until 1939, although it had a number of older native and foreign trees and shrubs when Senator Thomas C. Desmond started on his undertaking to grow all the native American trees and shrubs which will grow in Newburgh. For one thing he shipped in four specimens of the Giant Sequoia, balled and burlaped, from California. Added to the native species he has 174 of the more interesting and beautiful exotic trees and shrubs.

Of very great significance is the Seattle venture. Here is a tract of ground partly owned by the City of Seattle, under a perpetual lease to the University of Washington, partly owned by the State of Washington, developed to a large extent by Government funds (more than a million dollars has been spent on it), and run by a non-profit corporation, the Arboretum Foundation; membership is open to all who wish to help. The City has agreed to maintain roads and paths, light and water facilities and to police the tract.

The University of Washington accepted administrative control and has complete supervision, also carrying on scientific studies. The Foundation maintains an office, meets the bills, and looks after the publicity. In the first few years it furnished over \$11,000 through its activities.

Is it worth while? Arboretums are among the famous tourist attractions. Think of the Arnold Arboretum in lilac time, North Carolina in magnolia time; the University of Washington Arboretum is constructing a mile long Azalea Trail.

Kew Gardens carried on the rubber experiments which resulted in the plantations now in Japanese hands. The Arnold Arboretum has done much to introduce Far-Eastern plants into the United States.

What will the Rocky Mountain Arboretum give to the World? —M. WALTER PESMAN

NEW BOOKS

All those of the family of The Green Thumb will want to read (and reread) the new book by Harold W. Rickett entitled "The Green Earth" (The Jaques Cattell Press, Lancaster, Pa., \$3.50). It is a layman's guide to botany. It unfolds the wonderful story of the life processes in plants and shows how dependent all animal life is on the manufacturing of food by plants. It will give us all a new respect for the wonders and beauty of Nature. It is scientifically right but written in fascinating style.

"Shrubs and Trees for the Small Place," P. J. Van Melle. New York City, Chas. Scribner's Sons. \$2.50. (Contains a score card for 363 shrubs and trees.)

FOREST INFLUENCES

A lodgepole pine timber stand heavily cut produced 31% more water for stream-flow than an adjacent virgin forest of the same type. Of a total annual precipitation of 24.5 inches, 10.63 inches of water was available for stream-flow in the virgin forest and 13.88 inches in the heavily cut plots. These are

HOW DO YOU LIKE THE NAME of this bulletin? It seemed to be the best of many so far suggested. We would like a name which would immediately suggest Forestry, Horticulture and the Rocky Mountains or Colorado. The Green Thumb seems to suggest the one thing which binds all of us, of various horticultural interests, together. Let us have your suggestions as to name, character and contents of this new publication. We want it to be very much worth while and help to fill the long-felt need of a horticultural magazine for Rocky Mountain conditions.

If you are interested in Horticulture and growing plants from any angle—professional, or amateur—please take it as your personal responsibility to pass the word along to those you may know who might be also interested in the purposes of this new organization. Send names to the Secretary or to any Director and talk to your friends personally.

Wherever possible we should like to give notice in these pages of programs of interest to horticulturists, foresters and nature lovers. Notify the Secretary when you know of such a meeting being arranged.

some of the findings of an experiment that has been carried on during the past six years on the Fraser Experimental Forest, located on the St. Louis Creek near Fraser, Colorado, by the Rocky Mountain Forest and Range Experiment Station of the U. S. Department of Agriculture, Forest Service.

Twenty-five acre plots were installed all treated differently. In one plot all trees over ten inches in diameter were cut. The remaining plots were cut over to leave 2000, 4000 and 6000 board feet of merchantable trees per acre with one plot uncut as a check.

Winter storage of snow in a lodgepole pine forest increased in proportion to the intensity of timber cutting. Three seasons of measurement have established that an average of 7.60 inches of water accumulated in the snow on uncut plots before melting began, while 9.59 inches—an increase of 26 per cent—was found on heavily cut plots, from which all trees larger than 9.5 inches in diameter had been removed.

Dr. H. G. Wilm will tell about this and other findings in this experiment at the Colorado Institute of Forestry and Horticulture on February 26.

God in his wisdom put great peacefulness in trees. There tired eyes find welcome relief. Worn and weary nerves find rest. The sound of rain on the leaves is music, and the murmur of the night wind is a soothing lullaby.

—*Family Circle*

FORESTRY AND HORTICULTURE CONFERENCE

Denver, Colorado

Saturday, February 26, 1944

P R O G R A M



Forenoon—Humphrey's Memorial Auditorium, 16th and Lincoln

9:00—Registration.

9:30—Annual Meeting Colorado State Forestry Association

9:45—What's It All About?

M. Walter Pesman, President Colorado State Forestry Association

10:00—Colonel Allen S. Peck, presiding

Water Conservation—How Forestry Aids Horticulture (with kodachrome slides)

Dr. H. G. Wilm, Forest and Range Experiment Station, Fort Collins

10:30—Trees in Landscape Design (illustrated kodachrome slides)

L. R. Quinlan, Professor of Landscape Design, Kansas State College, Manhattan

11:25—Recreation and Forestry—Conservation of Natural Values

Prof. J. V. K. Wagar, Dep. of Forestry, Colorado State College

12:30—LUNCHEON AT THE COSMOPOLITAN HOTEL, ROOM D

\$1.50 per person (tax included)

Panel Discussion on POSTWAR HORTICULTURE

Clayton Watkins, Discussion Leader

L. L. Kumlien and L. R. Quinlan will discuss the topic from two different angles

Afternoon—Cosmopolitan Hotel

C. M. Drage, State Extension Horticulturist, presiding

2:15—From Victory Gardens to Peacetime Horticulture

Prof. A. M. Binkley, Head of Horticulture Department, Colorado State College

3:00—Dwarf Fruit Trees for Colorado

Dr. Louis R. Bryant, Associate Horticulturist, Colorado State College

3:30—Evergreens, How to Grow Them and Where to Use Them

L. L. Kumlien, D. Hill Nurseries, Dundee, Ill.

Discussions will follow each topic

NOTES:

Our Colorado authorities are too well known to need an introduction. C. M. Drage graduated from Victory Garden County Agent to State Extension Horticulturist. Professors Binkley and Bryant are tops in Horticulture. Dr. Wilm and Wagar in Forestry. Clayton Watkins is President of the Colorado Nurserymen's Association. Colonel Peck made a record as Regional Forester.

L. L. Kumlien is the author of *Hill's Book of Evergreens*, and is an outstanding authority on Evergreens in the United States.

Prof. L. R. Quinlan is a leading authority on Landscape Architecture.

Membership in the organization \$1.00 and up includes admission to both sessions.

\$5.00 pays for a sustaining membership.

History of

THE AFRICAN VIOLET

EMMA LAHR

FOSSILIZED ROSES found in Colorado and Oregon are believed by geologists to be thirty-five to seventy million years old. By contrast, the African violet is a newcomer to America, for the earliest record of African violets in the United States is that of a Philadelphia florist, William Harris, who in 1894 obtained two plants from a New York florist, George Stump, who had brought these plants from Germany. So, violets in the United States are 75 years old.

The African violet is not a violet, is not a member of the *Violaceae* family, though it does come from Africa. It is a *Saintpaulia* and a member of the *Gesneriaceae* family. The story of Saintpaulias begins in the summer of 1892 with the Baron Walter von St. Paul, the Imperial District Governor of Usambara, a province of North East Tanganyika in the Territory of East Africa. He sent either seeds or plants of "das violette Usambara" to his father, Hofmarschal Baron von Saint Paul of Fishbach, Silesia, Germany. Fortunately for us, the father was keenly interested in plants.

It is questionable whether plants or seeds were sent to Germany because in the summer of 1892 the plants had to travel by steamship from the east coast of Africa north, then west into the Gulf of Aden and northwest in the Red Sea, through the Suez Canal, across the Mediterranean Sea to the port of Trieste, Italy. From Italy the trip con-

tinued by railroad across Europe to Silesia, Germany, in all, a summer trip of about 25 days. It is most likely that mature plants with seed pods were sent as dried herbarium specimens.

The elder Saint Paul was a man of extraordinary vision. He gave the plants to Herman Wendland, Director of the Royal Botanical Gardens at Herrenhausen (Hanover), to identify and name them and to make arrangements for commercial distribution. Wendland classified the plant as a gesneriad, named the genus for the Saint Paul family, described it in Latin, and gave it the species name, *ionantha*, a Greek word meaning "with violet-like flowers." Mr. Wendland exhibited flowering plants in Ghent in June 1893, at the International Horticultural Exhibit, where they "shared with *Eulophiella* the honor of being the two most botanically interesting plants in the exhibition." Also in June 1893, Wendland published a description of the *Saintpaulia* in the German magazine *Gartenflora*. Later it was discovered that not one species, but two had been sent, and the second was named "*diplotricha*" because hairs on the leaves are of two kinds. *Ionantha* and *diplotricha* are ancestors of hundreds of present day African violets.

In later years a total of 24 species of *Saintpaulia* was found in Tanganyika and classified by the botanists B. L. Burtt, E. P. Roberts, and Engler. *Saintpaulia* species have been found nowhere else in the world.



Ownership rights for seed production and distribution were sold by Baron Walter von Saint Paul to the firm of Ernst Benary in 1893. The next year continental nurserymen carried the seed. People were delighted with a plant which bloomed all winter. Flowering plants were also developed in the Royal Gardens of England. A red-flowered variety was first announced by Mr. Benary in 1898. He developed a white variety called *alba* and developed other varieties designated *atrocoerulea* and *purpurea*.

Horticulturists in the European countries continued to present seeds and plants of the African violet to the public, whose enthusiasm for this house plant encouraged Walter L. Armacost of Armacost and Royston in West Los Angeles, California, to order seeds in 1927 from the firms of Ernst Benary of Erfurt, Germany, and Sutton's of London, England.

The foreman of the potted plant di-

vision of the firm was Walter Oetel who set to work with the seeds. Approximately one thousand plants were grown to blooming size from the seeds secured from Germany and England. A strict elimination plan was put into effect, and only one hundred plants were retained for further observation and propagation. After several years of studying the growth habit, character of foliage, colors and good blooming qualities, only ten came up to this firm's high standards. From the seed obtained in Germany, only two plants were retained, Blue Boy and Sailor Boy. The English seed produced eight violets: Admiral, Amethyst, Viking, Mermaid, Norseman, Neptune, Commodore and Number 32.

Armacost and Royston released these plants for sale from 1932 until 1936. Shipments were made to many countries, as well as distributed throughout the United States. Enthusiasm reached a high level for a while, but the indi-

vidual growers who govern the popularity of a plant were not well enough versed in its growing requirements. Demand for the violets fell off, and Armacost and Royston discontinued growing African violets. The firm of J. A. Peterson and Sons of Cincinnati, Ohio, had the foresight to recognize these outstanding varieties and purchased them, making it possible for us to have plants from the original stock. All the species and all ten of the Armacost and Royston Originals may be purchased today from J. A. Peterson and Sons, 3132 McHenry Ave., Cincinnati, Ohio 45211.

The first double blue violet, a mutant of Blue Boy, is credited to Edward Wangbichler of Inkster, Michigan, in 1939.

The first real pink single variety was developed by Frank Brockner of Milwaukee, Wisconsin, and was given a plant patent in 1942.

A true white violet was achieved by crossing a pink with a blue violet and was patented by Peter Ruggeri in 1943. In 1952 a patent was granted to Louis Ghiv of San Francisco for Lady Geneva. Each blue blossom was edged with white; thus the term "geneva" came to refer to blossoms with a white edge.

Star Sapphire, patented in 1953 by Robert Craig Co., was the first star-shaped blossom, having five petals of equal size.

Lyndon Lyon showed the first double pink violets at the African Violet Society of America, Inc., convention in St. Louis in 1954.

Today there are thousands and thousands of varieties of violets and many, many hybridizers, and many firms specialize in violets. In Denver three commercial firms specialize in African violets.

KNOW YOUR DWARF APPLE TREES

GUY FOX

MANY LOCAL gardeners are doubtful that dwarf apple trees will do well in the Denver area. Others have been growing them 15 years or more and prize them highly. The writer would like to submit some data that might help to clarify this situation.

The most important fact for local gardeners to recognize is that there are two general classes of dwarf apple trees: (1) those grafted on East Malling root stocks and (2) those using standard strong-growing root stocks with a dwarfing section grafted into the trunk of the tree. This is called an

"interstock" or "interstem" and involves two grafts.

The East Malling dwarfing root stocks were the first standardized root stocks developed and classified for dwarfing purposes. This was done during the first quarter of this century by the East Malling Fruit Research Station, East Malling, Kent, England. So significant was this development and so wide spread has been the use of East Malling root stocks that most garden writers, in this as well as eastern United States areas, refer to them as the only type worthy of consideration.

Yet there is serious doubt that these

root stocks are the best for the Denver area. In a 1964 book, *Dwarf Fruit Trees for Orchard, Garden and Home*, Dr. Harold B. Tukey, Professor Emeritus (Horticulture) of Michigan State University, states: "The Malling apple root stocks as a class have been employed successfully in the relatively heavy soils of England and North Europe. This region is also characterized by ample rainfall and by an equable climate. The extremes of winter cold and summer heat commonly found in parts of America are seldom if ever experienced."

Dr. Tukey points out that apple trees on these root stocks have done well in those areas of America where there is some similarity to these European conditions. But the performance of Malling root stocks as a class has been less impressive, he reports, in the areas south and west of these eastern United States areas.

Dr. Tukey then continues: "On the other hand, for trees on strong-growing American root stocks, but employing an intermediate stem piece such as the Clark Dwarf, the more favorable reports have commonly come from regions where trees on the Malling root stocks do not perform so well. Thus, many successful plantings of Clark Dwarf have been made in parts of Virginia, southern Ohio, southern Indiana, southern Illinois, Missouri, Kansas and the Great Plains areas. It is in these regions that the trees on the Malling root stocks have been less successful."

The writer has been experimenting with dwarf apple trees for 18 years. He has also checked with a considerable number of others in the general Denver area who are growing dwarf apple trees. His experience and observations tend to confirm Dr. Tukey's statements.

Most of the plantings with which he is familiar are of the double-grafted type (not East Malling), purchased from midwest nurseries that specialize in dwarf fruit trees. There have been losses but evidence seems to point clearly to two principal reasons: (1) winter kill due to lack of moisture before the tree was well established and (2) fire blight, particularly on the highly susceptible varieties such as Yellow Transparent, Lodi and Jonathan.

The following experience illustrates the winter kill hazard. In the spring of 1961, a modest orchard of seven dwarf apple trees, two standard apple trees, and an assortment of cherry, plum and pear trees was planted in Boulder Creek valley about 5 miles south of Longmont. The following winter (1961-62) was especially severe; temperatures in the 30's below zero were registered three different times at this location. All pear trees killed back to the ground, but all the rest, including the dwarfs, came through successfully.

The winter of 1962-63, while not so severe, was very dry. The orchard was not properly watered, and losses were very heavy. In the spring the standard apple trees and five of the seven dwarfs were dead, two of the three plums were dead and the two Montmorency cherries were half dead. Replacements have since been growing successfully.

What varieties are most successful here? The varieties most commonly planted, and that have been doing well, are the Red and Yellow Delicious. The writer has a 15-year old Yellow Delicious that bears regularly, usually two to three bushels or more. Also, Yellow Delicious is likely to go into production early, sometimes in its second year. An advantage of Red Delicious is its high resistance to fire blight.

Another variety that does exceedingly

ly well is Delcon. In appearance it resembles Red Delicious and is a consistent regular producer. It has an exceptionally long blooming period and on occasion has produced a good crop even though the first blooms were frozen. It is excellent for both eating and cooking from September through December. Fire blight damage to Delcon has been minor.

Undoubtedly, other varieties will also

do well. A friend reports good results from a dwarf McIntosh.

In summary, there would seem to be little reason why the local gardener should not enjoy the advantages of growing dwarf apple trees, but care should be exercised in their selection. Avoid East Malling root stocks. Buy only from reputable midwest nurseries who specialize in producing dwarf fruit trees for the midwest.

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Times Change, Landscapes Change

S. R. DEBOER

Time moves on as time always does.

Here it was a hot day in June 1965 and my telephone was ringing furiously. "You sent me a booklet of Colorado with beautiful pictures," said an Iowa friend.

"Yes, I did, a beautiful Colorado booklet. Where are you?"

"In Glenwood Springs," came the snappy answer. "Grace and I have been trying to find some of these beauty spots, so we drove up Mt. Vernon Canyon. Because I remembered how you talked about a broad parkway entrance to Denver, at Genesee Pass I stopped to look back. If Grace had not warned me, two cars would have smashed into me. She said sarcastically, 'Keep your eye on the road.' At 70 mph you must keep your eyes on the road. So, through a tunnel and over Vail Pass we came, and down into Glenwood Springs. I asked the filling station man about Glenwood Canyon. He said proudly, 'It is perhaps the most beautiful spot in Colorado. You must have come through it.' I had and I never saw it!"

Not only are the larger landscapes of our beautiful Colorado changing, the change in our large country places worries me. It is half a century ago that places like Cherry Hills were designed. Everybody wanted to live on a small farm. Many of my friends were not satisfied with one or two acres; they wanted five or ten.

A close friend of mine hired a Scotch gardener. Did he know his plants! In summer a German gardener helped out. He was equally well-in-

formed, perhaps more so than the Scotchman. Often I found them furiously arguing over the name of a plant. The First World War did not help international relations and my friend let the German gardener go. Help was scarce during the war and it was patriotic to cut down.

The days of the Scotch gardener and his antagonist, the German, have long since disappeared, but the trees and shrubs of those gardens have grown to maturity. Today, if there is any semblance to a gardener, he rides a power mower and his philosophy is blue grass. Like a traffic cop whose dictate of "Traffic must move" is absolute and final, the mower man dictates that the mower must move and what is in the way must get out of the way. So there go those little plants we brought from heaven knows where. They surrender. The days of fancy gardening are no more. The thought keeps me awake at night.

With these new conditions I believe gardens need redesigning. The large areas of grass must make way for groves of trees and shrubs. Solid forest planting, as in nature, is attractive and easy to maintain once it is established. There is no need for weekly mowing or twice-a-week sprinkling. Take a look at the groves in the mountains and you will see the beauty I see in them.

I believe our gardens need a new approach. Such a plan must be based on neighborhood studies which will make the homes and families safe from attacks by mechanical devices.



EXOTICS OF COLORADO

JASMINUM NUDIFLORUM, WINTER JASMINE

DR. HELEN MARSH ZEINER

The twenty-fifth anniversary of *The Green Thumb* inevitably brings to mind Horticulture House at 1355 Bannock Street, where so many years of *The Green Thumb's* history was made — and who can remember Horticulture House without remembering the winter jasmine that grew in such profusion along the fence?

Jasminum nudiflorum, winter jasmine, is one of the most interesting exotics grown in Denver, largely because of its habit of blooming during the winter months.

Almost any time from November onward, depending on the weather, winter jasmine may burst into bloom. There is nothing more delightful, on a winter's day, than to come upon a winter jasmine with its yellow flowers scattered like golden stars along the otherwise bare green stems.

At the first sight of a winter jasmine in bloom, you will probably think of forsythia. In both flowers and stems, jasmine does resemble forsythia. This is a natural family resemblance, for the genus *Forsythia* and the genus *Jasminum* both belong to the family

Oleaceae. Some other well-known members of this family do not show their relationship in quite such an obvious manner, but a closer study shows that they have much in common. These plants include *Syringa*, the lilac; *Ligustrum*, the privet used so frequently as a hedge plant; and *Fraxinus*, the ash, a common and desirable street tree in the Denver area.

Although jasmine is similar to forsythia in several ways, it is a more sprawling shrub than most forsythias. It is classed as a shrub, but it is sometimes aptly called a half shrub-half vine. Jasmine does not climb but needs some support, and it is suggested that it be grown on a fence or wall.

A well-established *Jasminum nudiflorum* will send up many slender upright green branches which arch and grow downward to the ground, where

they may take root. This results in a tangled growth, and in the south, where the plant thrives, it can produce real thickets.

Some pruning will be needed to keep the plant under control, but use discretion — several Denver gardeners report killing their winter jasmine by cutting it back too drastically.

Because the flowers are produced on last year's branches, prune as soon as convenient after flowering. This gives the shrub an entire season to grow new branches which will be the flowering wood.

Winter flowers are the main reason for growing this exotic, and, like forsythia, it is not an outstanding shrub during the summer, but neither is it unattractive.

Winter jasmine has small three-parted compound leaves, arranged in an opposite manner along the stems. Each leaflet is oval to oblong, narrow at the ends, and about half an inch to an inch long. Leaf stalks or petioles are very short.

The bright yellow flowers are usually about an inch across. They have six petals, spread so that they give a star-like effect. Flowers are borne one in a place on very short stalks, and thus appear to arise directly from the stem.

The genus *Jasminum* is said to produce some of the sweetest-scented of all shrubs. The flowers of *J. nudiflorum*, however, do not have a marked fragrance.

A black, berry-like fruit may be produced.

Jasminum nudiflorum is native to north China. It was introduced from China in 1844, primarily because of its winter-blooming habit.

The genus name *Jasminum* is derived from an Arabic word for jasmine. Jasmine, jasmin, and jessamine are all derived from this Arabic root, all are common names for members of the genus *Jasminum* and other genera of sweet-smelling plants. "*Nudiflorum*" means naked flowers.

Winter jasmine will grow well in Denver, but it does need protection, at least until it is well-established.

At Horticulture House, *Jasminum nudiflorum* grew against the south side of a high stake fence which ran along the north side of the lot. There was a narrow walk between the fence and the house, with very little other space. This provided a very sheltered spot between the high fence and the house, and winter jasmine flourished and produced its dainty flowers every winter for the enjoyment of those who used the walk.

LECTURE SERIES — 1969

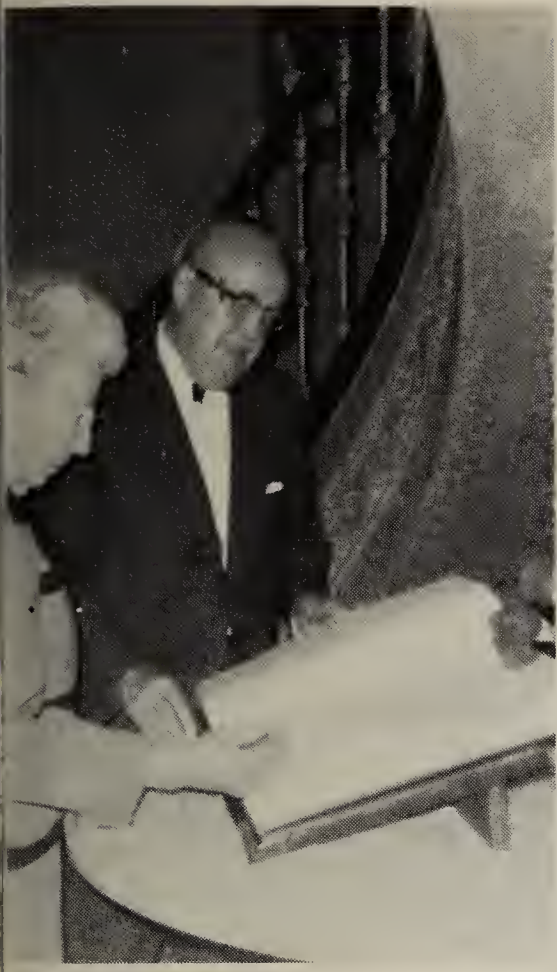
FEBRUARY 27 — DR. LOUIS B. MARTIN, Director, Denver, Botanic Gardens: "**Denver Botanic Gardens Master Plan.**"

MARCH 27 — DR. JAMES R. FEUCHT, Extension Area Horticulturist, Colorado State University: "**Common Poisonous Plants in and around the Home.**"

APRIL 24 — MRS. RUTH ASHTON NELSON, Writer, Teacher of Plant Identification and Informal Botany: "**Greek Wild Flowers.**"

MAY 22 — KENNETH HORN, Supervisor, Secondary Science, Denver Public Schools: "**Outdoor Education Potential for the Denver Public Schools.**"

These lectures will be presented in the Boettcher Memorial Conservatory, 1005 York Street, at 8:00 p.m. Single lecture tickets are \$1.00 and may be procured at Botanic Gardens House, 909 York Street.



BOOK OF MEMORY

Mrs. George H. Garrey and Dr. Robert L. Stearns admire the Book of Memory presented at a brief ceremony at Botanic Gardens House November 18, 1968. Members of the Board of Trustees and representatives of organizations and committees who serve the Gardens attended.

Some time ago Mrs. Garrey gave a hand-bound volume so that gifts and memorials to Denver Botanic Gardens would be permanently recorded. At the request of Mrs. Ed Honnen, chairman of the Memory Book Committee, Mrs. Walter B. Ash organized and artistically hand-lettered the names of contributors by year from the Garden's beginning in 1951 through 1966.

Dr. Stearns gave the following resume at the presentation:

"History is the record of people who accomplish things. This book records the names of people and organizations that have created and developed the Denver Botanic Gardens. Many have contributed as their names in this volume will attest. Some, however, whose contributions, financial and with constructive enthusiasm, have been so great that they deserve especial mention.

"On February 3, 1951, the Certificate of Incorporation of Denver Botanic Gardens Foundation was issued by its incorporators and by Denver City officials. Among the incorporators and trustees were:

Mrs. John Evans	Mr. Robert More
Mrs. George Garrey	Mr. George Kelly
Mr. Hudson Moore, Jr.	Mr. Milton Keegan
Mrs. Alexander Barbour	Mrs. Ed Honnen
Mrs. James J. Waring	Mrs. Churchill Owen

"Largely through the generosity of the Evans family and the donation of the headquarters building on Bannock Street, the Colorado Forestry and Horticulture Association came into being. In 1958 this Association joined with the Botanic Gardens and the City and County of Denver in concentrating on a

major project in developing the 18 acre area east of Cheesman Park. Mrs. James J. Waring gave the headquarters building at 9th Avenue and York Street in memory of her father, the late Henry M. Porter, and the Botanic Gardens was on its way.

"In 1963 an outstanding gift resulted in the construction of the now famous conservatory named in memory of Claude and Edna Boettcher. The essential greenhouses and the shelter for the Children's Garden were the gifts of Mrs. Waring. The Gates Memorial Garden, given by Mrs. Gates in memory of her husband, the late Charles C. Gates, started the development of numerous small garden plots throughout the area.

"In addition to those persons named above, the pages of this book designate many more of the persons who have made possible the growth and development of the Denver Botanic Gardens. It is impossible to enumerate the contributions and efforts of the great number of benefactors, individuals, foundations, garden clubs, etc.

"If you would see their monument — look about you!"



Black Hills Spruce (*Picea glauca densata*)

THE BEST EVERGREENS FOR HORTICULTURAL USE IN THE ROCKY MOUNTAINS

By ROBERT E. MORE *

IT is not easy to name the best plants for an area. Eliminating those that are tender or half hardy is not difficult; but to select from the hardy species those that are "best" involves taste and personal opinion. To furnish flexibility in this respect, I am following the practice adopted by Dr. Donald Wyman in his "Trees for America," and am submitting a preferred list and a supplemental list.

Of course any list of evergreens must be set up according to sizes. Having eliminated all climatically unadapted evergreens, size probably constitutes the most important medium of classification. Color and texture both must be inquired into, but fundamentally, ultimate size and rapidity of growth are the two primary considerations. We shall, therefore, discuss our hardy evergreens with respect to ultimate height and spread, and rate of growth.

Creepers

Ten years ago, creepers were found in botanical gardens only. Pfitzer, savin and tamarix junipers were suggested by landscape architects and sold by nurserymen as "low foundation plants." Comparatively, they were. But the grounds about ranch style houses that were landscaped 10 years ago—and especially those that were planted 20 years ago—are grossly overgrown today. And today, the informed landscape designer places creepers under windows and dwarf creepers in the rock garden.

Nurserymen offer two dwarf creepers for the small area or the rock garden, and two that grow more vigorously, for the location that demands an evergreen that will always be less than a foot in height. The BLUE WILTON CREEPING JUNIPER (*Juniperus horizontalis* Blue Wilton) and the GLENMORE CREEPING JUNIPER (*Juniperus horizontalis* Glenmore) are the lowest growing and the slowest growing of all. Glenmore creeper is dark green and pistillate, and thus has berries. (Most junipers bear staminate or male flowers on one plant and pistillate or female flowers on a different plant. Only the latter bear berries. Most people prefer berry plants. Many junipers offered in the nursery trade are propagated from grafts or cuttings rather than seed. A grafted tree is an exact replica of its parent. Hence grafts from a staminate parent, like the pfitzer, will all be staminate, whereas grafts from a pistillate plant, like Glenmore creeper, will all have berries.) Blue Wilton has a fine silver color. My plants have not produced berries thus far, but may as they get older.

The MARSHALL CREEPING JUNIPER (*Juniperus horizontalis* Marshall) and the ANDORRA CREEPING JUNIPER (*Juniperus horizontalis* *plumosa*) grow a little faster than the preceding and will ultimately cover an area 10 to 15 feet in diameter. The Andorra, turns a lovely plum color in winter, but does not wholly relish exposure to south and west sun and winds, from February to May. The Marshall is pistillate, and the Andorra is staminate.

Low Spreaders

A hardy evergreen between 12 and 24 inches in ultimate height is a "must" in every landscape design. SARGENT CHINESE JUNIPER (*Juniperus chinensis sargentii*) and two of the Russian savin junipers, namely BROADMOOR (*Juniperus sabina* Broadmoor) and BUFFALO (*Juniperus sabina* Buffalo) give us splendid plants of this size. Sargent will never get over two feet in height. It has berries. Broadmoor will be under 24 inches in height for many years. It is staminate, and looks like a dwarf, refined tamarix juniper. It was formerly called "Russian Savin No. 4." Buffalo is pistillate and bears berries early. It, too, is one of the Russian savins and has about the same growth habit as Broadmoor. It is a striking light green. Cutting the long tips of these two evergreens improves them.

Large Spreaders

These should not be used as foundation plants, except around apartment houses, hospitals and industrial buildings—unless the owner has the fortitude to replace the plant in about 5 to 7 years. And that is a practice that is being followed more and more. We repaint our house—at a substantial cost—every 3 to 5 years. Our rugs wear out and so does our furniture. If plants are treated as temporary, outdoor facilities, and are amortized, then our scope of planting material is immeasurably enlarged. A blue spruce or concolor fir, both of which get out of scale in 10 years when near a ranch style house, can both be used, if we replace them when they get too large. Any of the group now being discussed will make perfect foundation plants for 5 to 10 years. This is sound landscaping—if they are then replaced; otherwise, as stated, do not use them for foundation planting.

The best known and most frequently sold juniper in this group is the PFITZER (*Juniperus chinensis pfitzeriana*). Virile, tough, virtually pest free and always picturesque it has a place in almost every plantation. A visit to the Broadmoor Hotel in Colorado Springs discloses that in 20 years the pfitzer will grow 12 feet high—if placed against a building—and spread out for 20 to 25 feet. It is fast growing, 15 inches a year, and should never have its tips barbered into "burr" cuts. Its irregularity is its glory.

Even faster growing is the VON EHROH (*Juniperus sabina* Von Ehron). It forms a somewhat regular vase, with sharp spikes reaching for the sun. Both pfitzer and Von Ehren have no berries.

TAMARIX JUNIPER (*Juniperus sabina tamariscifolia*) also has male flowers only. But it does not need berries, for its color, texture and growth habit make it one of the finest horticultural gems available to Rocky Mountain plantmen. Tamarix in 12 to 15 years, will be perfectly symmetrical half moon 4 to 5 feet high and 8 to 10 feet in diameter. Its feathery, gray-green recurved plumes, all geometrically placed, make it indispensable to every home planting. Plant it 6 feet inside your street walk, and 6 feet to the side of your entrance walk.

TABLE TOP and COMMUNIS TYPE JUNIPERS (*Juniperus scopulorum* Table Top and Communis Type) are two fine large spreaders. These are grafts (clons) of our native scopulorum juniper. Possibly they have been confused with one another. My first specimens showed Table Top as staminate and Communis Type as pistillate. Later purchases of Table Top, however, had berries. To be sure of a berry plant, order Communis Type. These trees will grow 7 feet high and spread 12 feet. Each is a fine blue.

MUGHO PINE (*Pinus mughus mugo*) can be kept in bounds for 12 to 15 years by regular shearing. This will, of course, provide a formal plant. It is subject to scale (spray in early April with lime-sulphur) if soil or maintenance is lean. Prune it in the spring with hedge shears, taking off 90% of the new growth.

Medium Sized Upright Trees

This group will attain a height of 10 to 15 feet in 12 years, and 35 feet or better in 20 years. It has been estimated that the average home owner occupies a house from 10 to 15 years. Landscape architects adopt 12 to 15 years as the horticultural period the new home owner should contemplate. This group of evergreens, even though planted close to a ranch style house, will keep in scale at the corners of the house, for that period. They furnish with creepers in-between, the backbone of the average home landscape plan.

Most popular are Rocky Mountain juniper (*Juniperus scopulorum*) and eastern redcedar (*Juniperus virginiana*). Both of these species are quite variable from seed, so nurserymen have perpetuated the better types by grafts. During the last five years, every nurseryman seemed to feel he must have his own graft, and they are becoming as confusing as are the rose clons. The following are generally accepted among nurserymen as being among the better: *Juniperus scopulorum* clons:

GRAY GLEAM—Plant patent No. 848. Introduced by Scott Wilmore of Denver. Silver lavender color and slender form; bears berries when mature; a superb tree.

MOFFET—Fine blue, berry tree. Perhaps the hardiest of all and the easiest to transplant.

PATHFINDER—Spectacular blue; staminate.

MADORRA—Two types of foliage on the same tree; fine and unusual.

SUTHERLAND—Rather slender, dark green berry tree; tough.

COLOGREEN—One of the finest greens; excellent texture; berry tree. *Juniperus virginiana* clons:

DUNDEE—Compact, dense foliage, turning an arresting plum color in winter; staminate; probably the most popular redcedar.

CANAERT—Dark green, covered with tiny, light blue berries; gets straggly unless regularly sheared.

Unfortunately both of these species of juniper must be *regularly* sprayed for aphid and red spider. In the nurseries they are usually given a spraying in late March while still dormant, and at least one more treatment during hot weather. Spraying Rocky Mountain juniper and eastern redcedar is as necessary as watering, and should be viewed as a routine incident of ownership. During an unusually wet spring they may suddenly develop jelly-like orange-yellow masses in the branches. This is a rust that comes from a nearby member of the apple family, usually a hawthorn. One of the new antibiotics holds promise of control. Prior to this, the homeowner had to choose between hawthorns and junipers. The two hosts are necessary to the life cycle of the rust, so eliminating hawthorns will end the juniper blight.

Eastern redcedar is not hardy in the Colorado mountains.

Juniperus chinensis clons:

KETELEER—Rather open, dark green foliage, with the largest berries of

any juniper offered commercially. *J. Chinensis* is not subject to the cedar-apple rust, as are *J. scopulorum* and *J. virginiana*. A splended variety.

AMES—Heavy, dark green foliage. A new offering and a good one.

MANEY—Like Ames, a valuable seedling variation of *J. chinensis sargentii*. Bushy.

Other erect growing chinese junipers seldom look well groomed. Dead needles are held for many years, giving the tree an unhealthy appearance.

The ONESEED JUNIPER (*Juniperus monosperma*) and the Utah juniper (*Juniperus utahensis*) are two tough Colorado natives that do not require spraying. Oneseed juniper is yellow-green in cultivation, bushy and an admirable screen plant. Utah juniper is often a nice gray when young, and usually lacks the many stems of cousin Oneseed. The foliage on each is coarse and, when they are growing vigorously, very prickly.

Two, slow growing native pines are also used for screens and barriers. BRISTLECONE or FOXTAIL PINE (*Pinus aristata*) and PINYON PINE (*Pinus cembroides edulis*) are offered by all Colorado nurseries. Once established, each is virtually indestructible. The foxtail is sometimes difficult to transplant, perhaps because it is seldom grown from seed but is usually collected from rocky slopes at an elevation of 9000 feet. No tree is more picturesque, and it is worth replacing several times, in order to get one started. The pinyon seldom gives trouble.

Large Trees

All of these will "outgrow" a small house in 12 to 15 years. And when they are magnificently healthy and beautiful, it really does take will power to remove one. Countless Blue Spruces are, however, completely out of hand in every Rocky Mountain city. It is suggested, therefore, that use of these large trees be restricted to large houses in spacious grounds.

A large tree that "has everything" is the WHITE or CONCOLOR FIR (*Abies concolor*). The magnificent specimen shown in the illustration, which has not been sheared, is in Observatory Park at Denver University. Its soft long needles, grayish-blue color and symmetrical formal growth habit have made it a favorite throughout the world. It will stand sun or shade, is not fussy in moisture requirements, and is seldom subject to disease or pest.

The COLORADO or BLUE SPRUCE (*Picea pungens*) is, perhaps, the most famous specimen tree in the world. It has become somewhat a vogue to depreciate this tree as "too striking," "too colorful." Possibly these writers would vote against Miss America, because "too beautiful." The blue spruce must, of course, be fitted into an harmonious design, and should not be used to excess; nor should any other plant.

The LIMBER PINE (*Pinus flexilis*) is another Colorado native that deserves highest rating. Not as tall a tree as the others in this group, it can be further retarded by clipping its "candles" (buds) when they elongate in the spring just before sprouting needles. The tree shown in the illustration has a six inch trunk and is almost twenty years old. By cutting off half of each candle each spring it has been both retarded and made much fuller.

AUSTRIAN PINE (*Pinus nigra austriaca*) also should be used more than it is. Its handsome gray bark, brilliant dark green needles and its ability to hold its lower branches, make it a national favorite. It does not like the

mountains, however. There use ponderosa pine, described in the supplementary list.

Supplementary List

As previously noted, eastern redcedar is not happy in the mountains. With this exception, all of the following trees are completely hardy any place in the Rocky Mountains. The tree lists of others would include some of them in the preferred list. Certain of them, such as dwarf japgarden juniper, are more striking in appearance than those described heretofore. But a slight susceptibility to winter injury makes the plant last mentioned not quite as desirable, in my opinion, as those in the preferred list. The evergreen collector should, however, have all plants in both lists.

Creepers

DWARF JAPGARDEN JUNIPER (*Juniperus procumbens nana*)—Attractive gray; quite slow growing; the foliage arrangement suggests a nest of stars; staminate.

ADMIRABILIS CREEPING JUNIPER (*Juniperus horizontalis Admirabilis*)—Like Marshall creeper in appearance and growth habit, but staminate.

FILICINUS CREEPING JUNIPER (*Juniperus horizontalis Filicinus*)—Very low and slow growing; delicate foliage; not robust; staminate.

Low Spreaders

NATIVE COMMON JUNIPER (*Juniperus communis saxatilis*)—Keep in full shade and it will not brown in winter; awl-like green foliage, silver on the under side; get a pistillate plant.

PLUME PFITZER JUNIPER (*Juniperus chinensis pfitzeriana plumosa*)—Compact, slow growing; staminate.

ARMSTRONG JUNIPER (*Juniperus chinensis Armstrong*)—Yellow green, rather fine foliage; staminate.

Large Spreaders

KOSTER EASTERN REDCEDAR (*Juniperus virginiana kosteri*)—Lower growing and bluer than pfitzer, but otherwise similar in appearance; branches brittle; staminate.

BLUE HETZ JUNIPER (*Juniperus chinensis Hetz Blue*)—Fast growing, pistillate; cut back branches somewhat and a better shape is obtained; nice blue color; not quite as robust as pfitzer.

ARCADIA JUNIPER (*Juniperus sabina Arcadia*. Formerly "Russian Savin No. 3")—Yellow green, pistillate, smaller than ordinary savin, and not as erect.

SAVIN JUNIPER (*Juniperus sabina*)—Sometimes pistillate; handsome when at its best; often gets leggy with age.

Medium Sized Upright Trees

SWISS MOUNTAIN PINE (*Pinus Mughus*)—Multiple stems usually and almost as broad as high.

Rocky Mountain Juniper Clons (*Juniperus scopulorum*):

MARSHALL—Blue pistillate tree; rather open foliage.

DEWDROP—Two types of foliage; unique; staminate; sometimes hard to transplant.

HILL SILVER—Pistillate; fine silver color.

SILVER GLOW—Another fine pistillate silver.

Eastern redcedar clons (*Juniperus virginiana*):

SILVER—Wide branching, subject to snow injury if not vigorously pruned: fine silver; pistillate.

PYRAMID—Fine form and color.

SCHOTT—"A light green canaert."

GOLDTIP—End of branchlets gold in spring; a novelty.

Probably the following (they are still somewhat experimental):

SWISS STONE PINE (*Pinus cembra*)—Fine color and shape, soft needles (five) slow growing; seems to be hardy, though wants acid soil and probably some protection from spring sun and winds.

MACEDONIAN PINE (*Pinus peuce*)—Looks and grows like Swiss stone pine; apparently very hardy; less susceptible to white pine blister rust than any five needle pine.

Large Trees

PONDEROSA PINE (*Pinus ponderosa scopulorum*)—Colorado foothills tree; rugged and handsome; wants sun and elbow room.

SCOTS or SCOTCH PINE (*Pinus sylvestris*)—Open growth, two rather short, light colored needles in bundle; top of tree trunk a light brown.

BLACK HILL SPRUCE (*Picea glauca densata*)—Dark green, compact; excellent for hedge; slower growing than Colorado spruce.

DOUGLASFIR (*Pseudotsuga taxifolia glauca*)—Graceful shape, doesn't like southern exposure; alternate host for aphid that disfigures tips of spruce in spring; do not plant spruce and douglasfir close to each other.

* Mr. More, a founder of Colorado Forestry and Horticulture Association and charter member of the Board of Trustees of the Botanical Gardens Foundation of Denver, Inc., did unequalled experimental research on conifers and their hardiness in this area. His interest in this hobby was so intense that he collected evergreens from all over the world. In 1958, 262 varieties of conifers were growing at his Glenmore Arboretum near Buffalo Park, Colorado. At his Denver home he experimented and compared varieties for hardiness and landscape value. The Robert E. More Pinetum, his gift to the City and County of Denver in 1954, is part of the Denver Botanic Gardens complex near the Museum of Natural History in City Park.

He contributed numerous articles to this magazine and his work was published by the Arnold Arboretum, Brooklyn Botanic Garden and the University of Washington. A monograph, *Colorado Evergreens*, published by the Denver Museum of Natural History, is available in the library at Botanic Gardens House.

"The Best Evergreens for Horticultural Use in the Rocky Mountains," appeared in *The Green Thumb* in March-April 1956 and is the first of four articles selected for reprinting during the year in commemoration of our twenty-fifth anniversary.

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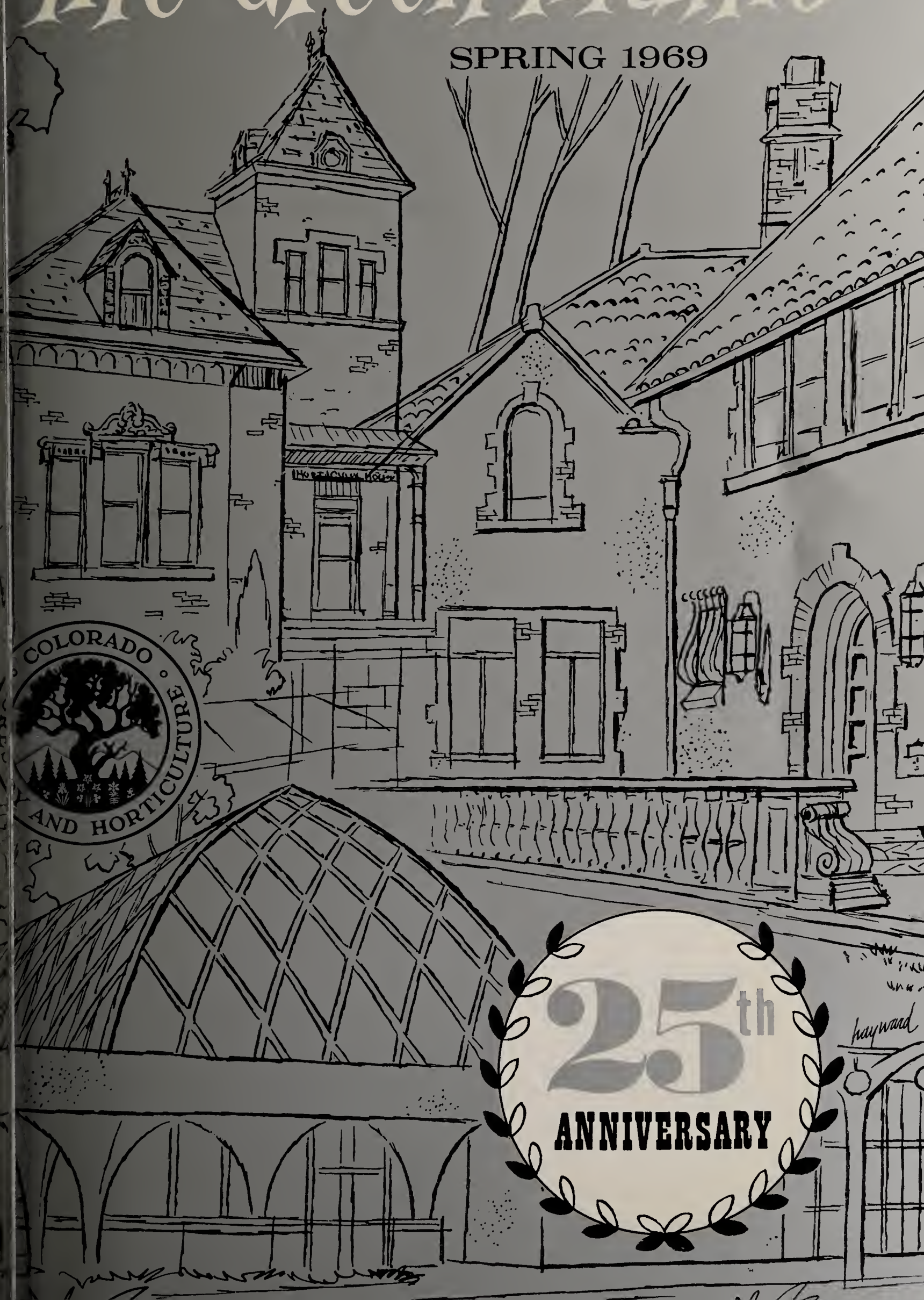
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A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden center around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

SPRING 1969



25th

ANNIVERSARY

THE COVER

TWENTY-FIFTH ANNIVERSARY

Montage by Phil Hayward

THE GREEN THUMB

VOL. TWENTY-SIX, NUMBER TWO

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The Green Thumb

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DAVID A. BLADES, *Editor*

SPRING 1969

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By becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the use of the books in the Helen K. Fowler Library at Botanic Gardens House.

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Some Spring Wild Flowers of Greece

RUTH ASHTON NELSON

Because I have always loved the little plants which will bloom in our gardens in other than the summer season, I was delighted with an opportunity to spend the early months of 1968 in Greece, where many of our small bulbous plants are native.

When I first arrived, just before Christmas, the only "wild" flower I found in bloom was a small-flowered, native calendula. There was no mistaking it in spite of its small size. It blooms in winter along sidewalks, where there are sidewalks, and at roadsides.

In mid-January I walked out to the barren hills around Kifissia, near Athens, looking for signs of spring. There were no great displays, but I was not disappointed. Between the stones, the ground was decorated with the beautifully patterned leaves of *Cyclamen neapolitanum*. This autumn-flowering species had finished blooming before I arrived. I must go back to Greece sometime in November to see it in bloom. Later, on Crete, I found a lovely white species in flower.

On that January day, there were also grape hyacinths pushing dark blue buds up from cracks between the stones of an abandoned quarry. But the greatest thrill was to discover, tucked in under the branches of small thorny shrubs, the wild Grecian crocus. *Crocus seiberi* var. *attica*. I had to look carefully to find it because the ages-long overgrazing by goats has eliminated such dainty things from all accessible places.

Later, driving out with a friend on

a rainy day after greenness had begun to come, I caught glimpses of brilliant rose color which turned out to be the large-flowered *Anemone coronaria*. This is a parent of the de Caen and St. Brigid strains. In favorable situations the wild forms seemed to me as handsome and appeared in as many different colors as the cultivated varieties. Blue, purple, lilac, pink, white, deep rose, and scarlet forms are there.

As spring progressed I had opportunities to go farther afield and to visit many of the famous archaeological sites. The old ruins with their perfectly proportioned pillars are impressive and inspiring, but their beauty is definitely enhanced, to my eye, by the charming plants which adorn them. Everywhere one finds familiar plants softening the severe outlines of the stone. Perhaps the most common and abundant is *Alyssum saxatile*, "Basket of Gold." At the Acropolis it was blooming in mid-winter; at Delphi we saw it in mid-April. A delightful, gray-leaved campanula, *C. rupestris*, hangs from crevices over gateways in the old medieval fortifications and many other places. A handsome, large wavy-leaved mullein with pale yellow blossoms leans against weathered stones and the common, but always lovely, red corn poppy of Europe flourishes in corners of old walls, as well as in fields.

In February, near the classical temple of Poseidon in its beautiful setting looking out to sea from the tip of Cape Sounion, I first saw the little bearded iris, *Iris pumila*. This was the pale yel-



Iris pumila

low form with maroon on the falls. It is little different from the common, dwarf garden variety. Later I found both this and the deep purple one in several other places. The most exciting location was among huge blocks of rock above Delphi high on the flanks of Mount Parnassus. Here also, to my surprise, was the very handsome *Vinca major*, with deep, purple-blue blossoms.

Surprising to me were the many kinds of terrestrial orchids. Numbers of them grow on stony soil among the thorn bushes, a few on marshy ground or forest fringes. On the little mountains which surround Athens, Mt. Hymettos (from whence the famous honey comes), Mt. Pendeli (where the ancient marble quarries are still in evidence, and Mt. Parnes, the highest of the three (a little over 3,000 feet), they were abundant. Some species occur over most of Greece. The large genus *Ophrys*, has an infinite variety of



Campanula ruprestris



Anemone hortensis

curious orchid faces, many of them suggesting bees or other insects. It takes an orchid specialist to classify them.

The olive groves, vineyards and cultivated fields of Greece are brilliant flower gardens in spring. Here the anemones occur in great variety, and in addition to *A. coronaria*, there is a gorgeous clear red variety of *A. hortensis*. Surprisingly, a very handsome native tulip, *Tulipa boeotica*, flourishes in grain fields. This is a comparatively large-flowered species, Red Emperor color and with black and yellow markings but with perianth segments more attenuate. It seems that the bulbs are so deep, ten inches or more, that cultivation does not reach them and they bloom and ripen before the harvest. Tulip planters might take a hint from this. The children pull these tulips and offer them for sale in great armsful by the roadside. There are several other native tulips in Greece which I did not see.

A large-flowered, beautiful oxalis from South Africa has become a noxious weed in vineyards and orchards. But the solid yellow beds of it present a lovely color combination with the gray foliage and black trunks of old olive trees.

In southern Greece, on mountains that have an elevation of over 3,000 feet, there is a forest of the beautiful Greek fir, *Abies cephalonica*. Here one finds moist glades with beds of *Anemone blanda* and both yellow and purple crocuses. This anemone is a delightful little thing. In spite of its name, it comes most commonly in a lovely blue, and there are pink and lavender forms. On Crete I found it truly white. I have never grown it but have seen it naturalized in English gardens where it blooms very freely along with daffodils and early tulips. Scillas and grape hyacinths are there



Verbascum undulatum

also and a pinkish, dainty little *Cory-
alis*.

Greece has several fall-blooming plants of interest to gardeners. I saw them in leaf or fruit only, or not at all. There are more than one fall blooming cyclamen, several crocuses, at least two sternbergias and several colchicums.

Our gardens have been greatly enriched by plants from this eastern Mediterranean country. The Mediterranean climate with its hot, dry summers and

cool wet winters has favored the development of plants with root storage facilities, so we find most of these I have mentioned have bulbs, corms, tubers, or fleshy rhizomes. This enables them to rest out the hot dry season, store up moisture during winter rains and be ready to bloom promptly in fall or spring. Because of this habit of dormancy, they have become available to gardeners in a very convenient form, packaged by nature.



Don't be left out!

Remember the Denver Botanic Gardens Plant Sale, Friday and Saturday, May 9th and 10th. Time will be 9:30 a.m. to 5:30 p.m.

SKIING'S OTHER SEASON

JAMES L. HAGEMEIER

Winter in Colorado is synonymous with snow—and skiing. Glamour sport of the '60's, skiing has generated many new developments on National Forest lands. Expansion at ski areas continues at a rapid pace in an effort to keep up with the demand. New runs, lifts, and even snow-making machines are being installed as quickly as contracts can be negotiated. These developments have created an enormous impact on the land resources.

The skier has long since gone before the seriousness of these impacts becomes evident; spring comes, and with it, skiing's other season. The snow ranger discards his skis and parka to become a forest ranger again. No longer is he worried about avalanches; his concern for the ski area involves such terms as runoff, erosion, aesthetics and design. There are many areas in Colorado for him to worry about.

All of Colorado's National Forest based ski areas are at high elevation, ranging from a low of 8,000 feet to above 11,000 feet. Soils in this life zone are highly susceptible to erosion when disturbed by construction. At the outset, little was understood about factors that cause or prevent soil erosion. There was much to learn, and it had to be learned in a hurry.

No one, including the Forest Service, was prepared for the surge in skier demand or the massive numbers of construction projects that occurred during the early '60's.

It soon became obvious that something had to be done to control the destruction created in the name of expediency. A time for action in the form of research and planning was at hand.

Drastic steps were needed to prevent further soil damage. The Arapaho National Forest was one of the first units to take the initiative.

The first step was to suspend the use of bulldozers in ski area slope construction. The bulldozer is an essential piece of equipment in ski area development. With improper use, it can become a dangerous weapon against nature. Next, soil scientists were called in to analyze the soil types and determine erosion potentials on existing and proposed ski areas. Hydrologists studied existing bulldozed slopes in an attempt to determine methods of controlling surface runoff which had created extensive gullying on most of the major ski slopes. Foresters experimented with grasses in an effort to find a mixture of species that would grow at high elevations. Mulch, which would hold the seed and provide protection for the new catch of vegetation, was applied. Landscape architects launched a revolutionary phase of ski trail planning designed to enhance the environment, improve utility and provide maximum protection of the natural resources. Ski area operators gave their full support to the all out effort to turn barren slopes back to grassy mountainsides.

The techniques of proper ski area construction can vary considerably from one area to another. At Buttermilk Mountain, in the White River National Forest, clearing of trails by bulldozers was an acceptable method of construction. The soils were deep, rich and highly organic. Grasses literally sprang up overnight. In contrast, at Breckenridge Ski Area, the same type of activity caused massive erosion, sil-



Extensive erosion on a ski trail caused by uncontrolled water and lack of vegetative cover.

filled beaver ponds, and extensive stream pollution. To stop this erosion, Forest Service hydrologists developed a water diversion system called "water bars." Water bars are ditches built on a contour, which drain water off slopes and into natural stream beds or into undisturbed areas where water can percolate into the soils. Immediately following installation of water bars, the area was seeded to grass and mulched with straw. A carefully calculated mixture of rye, fescue and brome grass seed was sown on the site. Fast-growing rye grass provided a quick catch and early soil stabilization. Fescue and brome followed more slowly, but produced a dense permanent cover.

Unfortunately, it is extremely difficult to revegetate a raw, newly constructed ski slope. Factors making the

job difficult include such drawbacks as high elevation, cool temperature, short growing season and poor soils. Studies made by the Forest Service, however, have established proven methods for future ski area development. These methods will hopefully offset some of the previous difficulties encountered with erosion on steep slopes. Soil disturbance will not be permitted. Trees must be cut at ground level since stumps present a skiing hazard, and disposed of by burning or removing. The natural plant materials remaining will be left undisturbed so they can continue to grow and protect the fragile soil. On flatter ski runs bulldozing will be authorized in problem areas where hazards to public safety are a factor. In this case, bulldozing will be done on a contour and only for short

distances. It will be a requirement to mulch and seed all fresh cuts immediately. On lift tower locations, or other construction sites, the same method of immediate rehabilitation will be required.

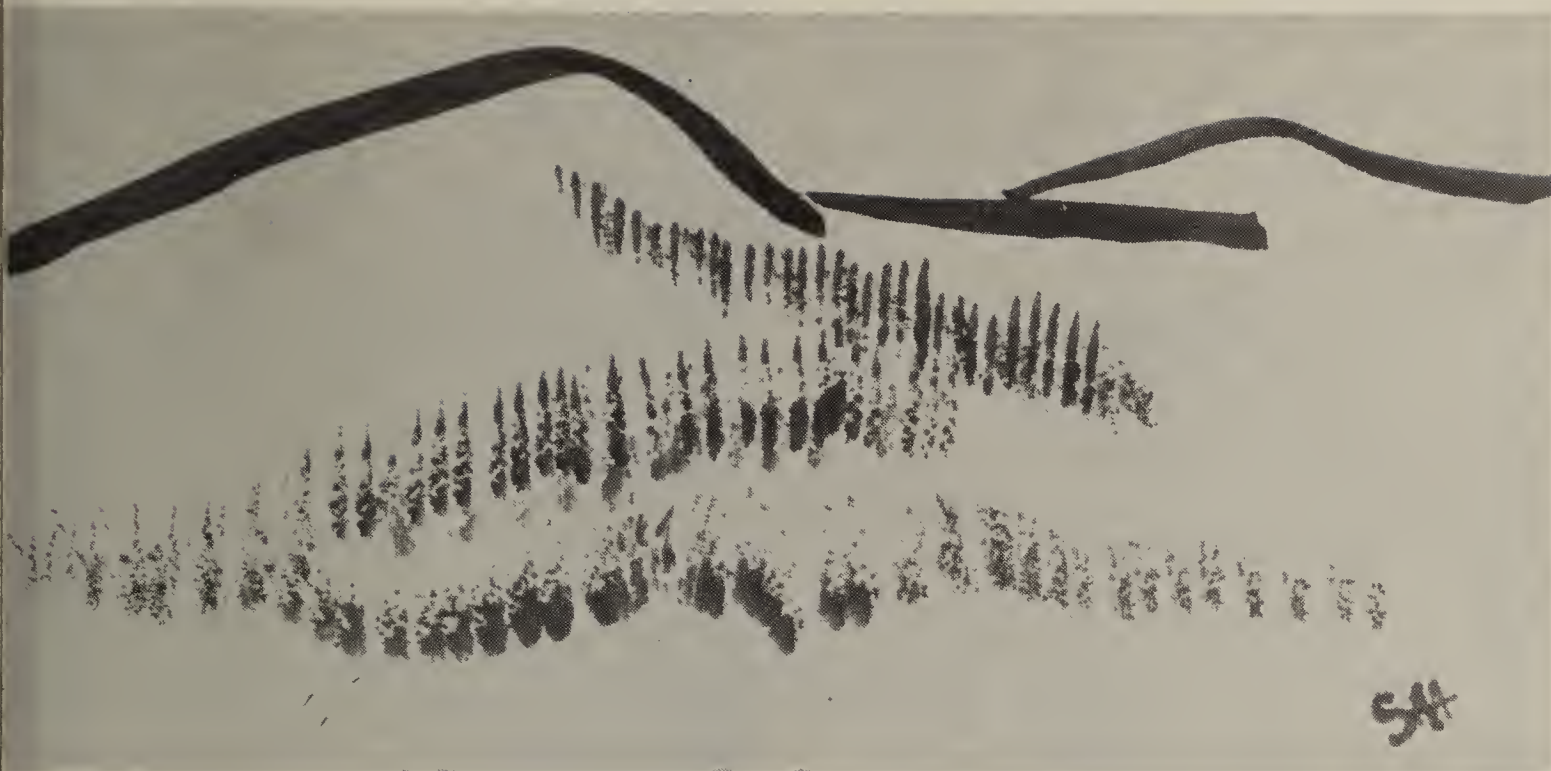
New methods are constantly being discovered — some by research, some by accident. A recent “accident” may prove highly beneficial for future use. Along a portion of newly constructed Interstate 70, where all backslopes were seeded by blowers, a large amount of seed blew into the roadbed by accident. A short time later, the road was sprayed with an asphalt dust-retardant. Several weeks later, thousands of grass shoots were breaking through the thin asphalt cover. The thinly applied coat of asphalt gave the soil protection from erosion, helped retain soil moisture, and

soaked up the warm rays of the sun, creating a virtual grass incubator. Discoveries such as this, and further experimentation with various plant species, such as Madison Vetch (now being successfully used to rehabilitate the cut slopes of Interstate 70 between Idaho Springs and Georgetown) are helping to eliminate erosion and the stark barren slopes of construction.

As the ski industry has grown, so has the awareness that proper utilization of natural resources is essential in maintaining a desirable environment. Not only is water pollution and erosion of vital concern; of equal importance is over-all protection of the landscape for the thousands of Coloradoans and out-of-state summer visitors who consider the beautiful Rockies an incomparable asset.

A mulching blower spreading mulch, seed and fertilizer on a ski trail in an attempt to revegetate it.





Visit Mt. Goliath this summer – open from about June 15 to about September 1. Take the M. Walter Pesman Trail and learn about the fascinating world of tundra plants.

PLANNED BUILDING BECOMES REALITY

The planned education building for the Denver Botanic Gardens became a reality with the resolution (quoted in part, below) presented by Hudson Moore, Jr., on the evening of Thursday, February 20, 1969, at a special meeting of the Board of Trustees:

“WHEREAS, the original concept of the complex of buildings at Denver Botanic Gardens included an educational building adjoining the conservatory, sharing an entrance lobby with it, and further providing complementary library, herbarium, display, classroom and meeting room facilities, that would enhance the usefulness and purposes of the conservatory, and

“WHEREAS, Denver Botanic Gardens, Inc. lacks sufficient funds to provide for the construction of this educational building, thereby accom-

plishing the purposes jointly shared with the conservatory to provide botanical education and enjoyment to the citizens of Denver and Colorado.

“NOW, THEREFORE BE IT RESOLVED: That the Trustees of Boettcher Foundation hereby authorize an additional grant in the amount of \$500,000 to Denver Botanic Gardens, Inc. for use in the construction of said educational building on the site adjoining the Edna C. and Claude K. Boettcher Memorial Conservatory on the east side, in accordance essentially with approved plans by Hornbein and White, Architects, dated September 16, 1963.”

This grant in combination with the funds previously raised for the education building will allow construction of the building to begin this June.

Annual Review

BEVERLY PINCOSKI

THE ALL-AMERICA flower selections for 1968 lived up to expectations and presented a colorful showing at the Gardens last summer.

Blaze verbenas grow about 6 inches high with vivid red blooms on full and spreading plants. It has the same dwarf growth habit as Amethyst verbenas, the 1966 All-America winner. Most red verbenas have a white eye center. However, *these* florets are solid in color with an occasional speck of white.

An outstanding import from Japan that achieved All-America status in 1968 was Golden Triumph celosia. The feathery plumes are a deep golden color, and plants are about 2 feet tall. This variety planted with the already popular red Forest Fire celosia makes a striking combination.

A bright new color in zinnias made its debut last year with Wild Cherry, the Silver Medal Winner. The color, as the name implies, is a nice variation from the usual scarlet and red-orange varieties. The plants grow to about 2 feet, and the prolific cactus-flowered blooms are up to 5 inches across.

The marigold, Jubilee series, has had two All-America winners, Golden Jubilee in 1967 and Orange Jubilee in

1968. Both are about 18-22 inches high and are often referred to as hedge-type marigolds as the densely foliated, uniform plants resemble a hedge when planted in a row. They are free flowering with 3-inch blooms. Diamond Jubilee, a sunny yellow, completes the series.

First Lady is another hedge-type marigold. The 3-inch double carnation blooms are bright yellow. This variety is similar in type and color to the popular Yellow Climax but is about 18 inches shorter with slightly smaller blooms.

The "something really new" in annuals for 1968 was the introduction of geraniums grown from seed. Previously, all commercial geraniums were obtained from cuttings. They are entitled Carefree geraniums because they are disease-free, are self-branching and need no pinching or pruning. Also, they are true to color. Three of the eight introductions last year received All-America honors — Scarlet, Deep Salmon and Bright Pink. Others in this series are Red, Picotee, Light Pink, Light Salmon and White. These geraniums present a light and airy appearance as the blooms are few per plant and are carried high above the foliage. The



Zinnia TORCH

dead bloom stalks are very conspicuous and to maintain a pleasing appearance need to be removed as soon as they are gone. One disadvantage is that they are slow coming into bloom whereas geraniums grown from cuttings will be in bloom when they are taken from the greenhouse and transplanted outside. Our limited growing season requires maximum bloom in a short period of time. In comparing both types of geraniums grown at Denver Botanic Gardens last summer, it was generally agreed that the plants grown from cuttings produced more bloom than those grown from seed.

One of the most pleasing and promising annuals tested last year was the dwarf rose-pink zinnia called Thumbelina Mini-Pink. Mini-Pink is the first separate color of this type. Thumbelina came out as a mixed variety and was an All-America selection in 1963. The plants grow to about 6 inches and are covered with bright 1½-inch blooms. A prolific bloomer, it would be good as a border or edging plant or in any situ-

ation where low, uniform and colorful plants are needed throughout the summer.

The Joy series of petunias will be available this year. These are low-growing plants about 10 inches high with 2-inch blooms. Plant vigor is only average, and they are not prolific bloomers. Under test, Pink Joy and Star Joy showed to be the best of this series with Rose Joy and Red Joy rated next. White Joy and Purple Joy were not too impressive. The bicolor, Star Joy, a dark, bright pink with a white star, was quite consistent in uniformity of pattern.

Bridal Bouquet, a new low-growing (9 inch) grandiflora white double petunia, has good clear color and petal substance. In the trials, however, it did not produce many blooms. A salmon-pink grandiflora with yellowish throat called Harvest Moon will also be available this year. During testing it appeared to be a good variety. Blooms are 3½ inches on 14-inch plants. The color is good with only slight fading.

Showing well in its second year of



Petunia PINK BELLS

testing was Orange Bells. The name is somewhat misleading as it is actually red-orange. Plants are low-growing, about 10 inches, and are quite uniform. It is very floriferous with 2-inch blooms and is quite attractive. A companion to this variety and a new addition to the Bell series is Pink Bells. It has the same growth habit and flower size but is bright deep pink with a white throat. Some fading was noted.

Two other petunias that did well were Victor, a red grandiflora and Black Magic, a dark purple multiflora. One new petunia for 1969 introduction that was not too impressive during testing was Lollipop. The 2-inch blooms have a yellow throat sur-



Snapdragon BRIGHT BUTTERFLIES

rounded by cream and edged in deep pink. The petal substance was poor and the overall color effect was not pleasing.

Bright Butterflies snapdragon, a 1966 All-America selection, has been

an interesting addition to the Gardens during the past two years. The florets, of red, pink, yellow, salmon, white, rose and bronze, depart from the conventional snapdragon flower form and have a flaring bloom that looks like a penstemon flower. Last year Tall Bright Butterflies was tested and is now available. Flower colors and type are the same except the individual florets are a little larger, and the free branching plants are taller (30 inches).

Another bright spot in the garden was the plot of dahlia Border Jewels. The vigorous plants were covered with 2½-inch white, yellow, orange, coral, purple, red, buff and pink blooms. This variety was coming into bloom when transplanted from the greenhouse and bloomed continually until frost.

Some of the new plants being introduced in 1969 by various seed companies include:

Marigold — Fantastic, orange with aster-like appearance, 3½-inch blooms on 2½-foot plants; Gay ladies, gold, yellow and orange mixture, 3½-inch blooms on 18-inch plants; Moonshot, 3-inch bright yellow blooms on 14-inch plants; and Spanish Brocade, patterns in combinations of gold, light orange and mahogany-red, 2¼-inch ruffled blooms on 14-inch plants. The trend for 1969 appears to be larger blooms on shorter plants.

Petunia — Blue Riches, double lavender-blue with royal-blue veining; Bridal Bouquet, white double; Harvest Moon, salmon grandiflora; Joy series — Pink, Red, Rose, White, Purple and Star, multiflora; Lavender Lady, lilac grandiflora; Miss Blue, double lavender-blue with darker veining; Rose Magic, bright rose grandiflora; Royalty, grandiflora mixture of red, salmon, pink and yellow; Scarlet Magic, scarlet grandiflora and Tangerine, orange-red with white throat, grandiflora.

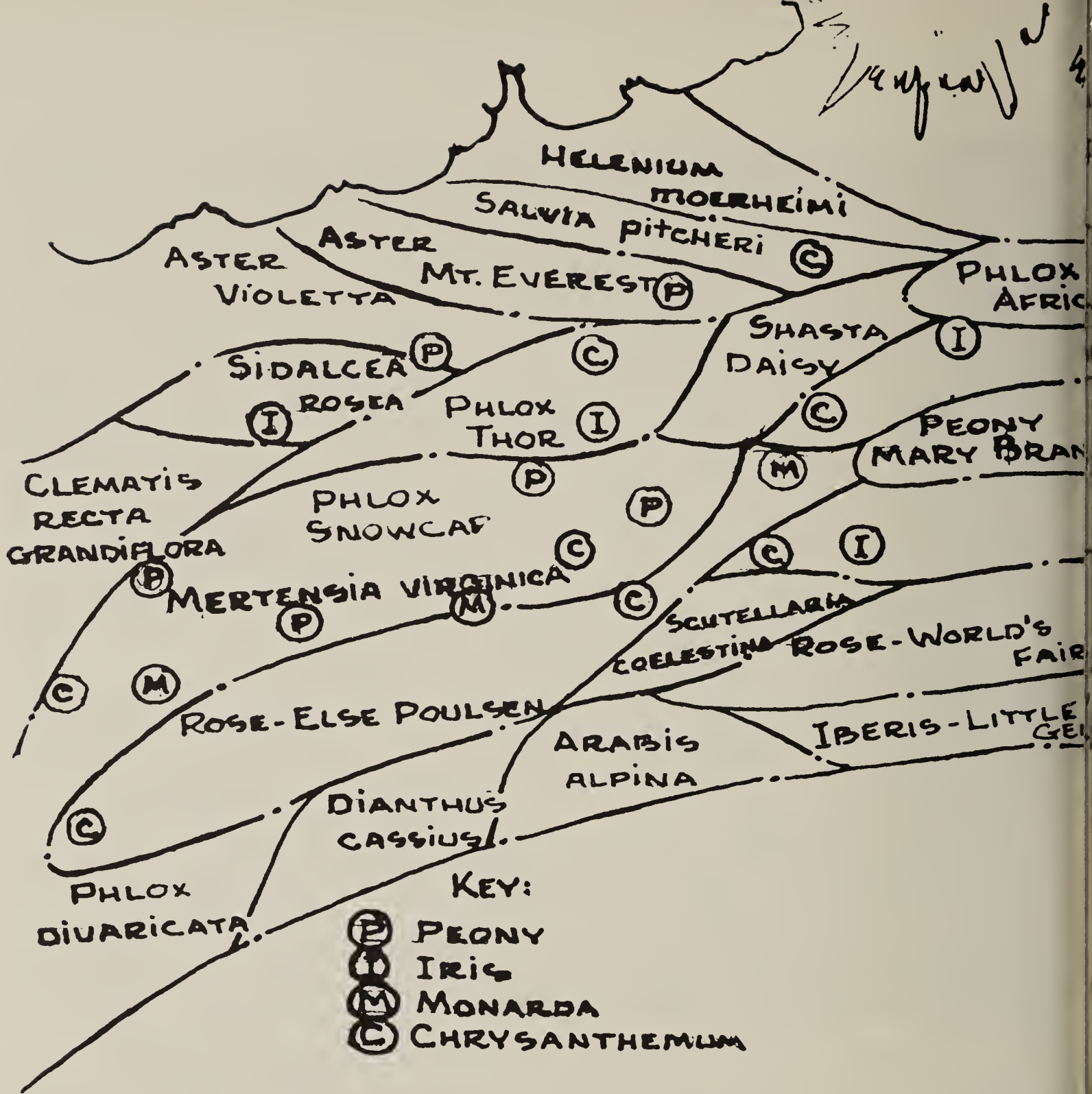


Vinca rosea POLKA DOT

Miscellaneous — Sweet Pea, Glamour Girl, semi-dwarf, salmon-pink on white; Angel Face, semi-dwarf, pink picotee on cream; Cream Whiz and Blue Sails. — Snapdragon, Scarlet Supreme and White Supreme, doubles on 3-foot plants. — Alyssum, Tiny Tim, white (3-inch plants. — Calendula, Orange Baby, 12-inch plants. — Impatiens, Elfin series, Pink, Crimson, Fuchsia, Scarlet, Orange, White, Rose or Salmon in individual colors or mixed. — Gloriosa Daisy, Irish Eyes, golden-yellow with emerald-green eye, 5-inch flowers on 2½-foot plants and geranium, Carefree Crimson.

Three Zinnias, one vinca and one cornflower (bachelor button) took top honors among all competitors to be

designated 1969 All-America selections. Snowball cornflower is 12-inches high with white blooms that tolerate summer heat. *Vinca rosea* Polka Dot has white flowers with red eyes and dark green foliage. The plants grow to 4 inches, are spreading and can grow in sun or light shade. Zinnia Cherry Buttons received the Silver Medal Award. It is a little shorter than the other button varieties being about 12 inches high, and the 1½-inch blooms are vivid cherry-red in color. It is said to be a profuse bloomer. Zinnia Torch is a brilliant rich orange cactus-flowered variety with 5-inch blooms on 24 to 30-inch plants, and Rosy Future zinnia is also a cactus-flowered variety of rose color with 6-inch flowers on 2-foot plants.



COLOR ALL SUMMER

By KATHLEEN MARRIAGE

WHAT is a herbaceous perennial? It is no disgrace not to know, but just in case some reader thinks so: a herbaceous perennial is a plant whose flower stems persist only long enough to allow development of seeds and whose roots may live for several years.

This living for years suggests stability and dependability, qualities which endear them to us and are responsible by their very permanence for pleasant associations. Those red peonies or his lily of the valley we are growing probably because we associate them with the joyous days of

youth from which time has erased all unpleasantness.

Perennials are at their best in a big bold planting with a dense, high background of trees or shrubs or both, seen across a wide expanse of green-sward. All this green depth permits us to take liberties with color that might produce tragic results in conflict with a bare wall, a bare driveway or patches of sunlight on bare earth. The first requirement is a green backdrop. For quantity and continuity of bloom our border must face the sun for at least half the day, longer in midsummer.



*Peonies,
demonstrat-
ing the
effectiveness
of mass
planting.*

hind and between yellow tulips are groups of *Trollius europaeus*; near pinks are drifts of blue *Mertensia virginica*. These combinations make a really gay show in late May. Following tulip season a central interest is maintained, still red, by a group of four Peony Mary Brand. At four-foot intervals outwards are Peonies Therese and Walter Faxon chosen for their warm non-fading pink, and near the outer ends Peonies Nellie and Marie Jaquin, so arrangeable as cut flowers.

Following Peony season the central attraction is a group of a dozen or so Delphiniums, Millicent Blackmore in the middle softening outwards to mid-blue Pacific hybrids—still farther out a few Belladonna for cutting. Groups of Irises at regular intervals give repetition both of distinctive flower and foliage which fill the gap between tulip time and peonies: Red Amber and the Red Douglas towards the center, next Ola Kola and Prairie Sunset, and near the ends Elmohr and Blue Shimmer.

Before the last peony has gone a few groups of Madonna Lilies followed by Regals give a cool, dignified air until phloxes are ready to begin. I'm sorry for the people who don't like these summer phloxes. They have not the airy grace of columbines nor the dignity of lilies but they have persistence in keeping on the job. If

seeds are prevented forming, not—mind you—cut off when they have half matured, the late summer lateral flowers are even more enjoyable than the big first heads.

Of course it is important to select good clear colors. After our Mary Brand Peonies we have Phlox Africa, fifteen of them in the center and following the same tailing-off pattern as with tulips and peonies are pink Phloxes Thor westward and Jules Sandeau eastward, finishing up with that best of all whites, Snowcap, originated by the late Darwin Andrews.

Since phloxes incline to be solid looking we have groups of Shasta Daisies, *Sidalcea rosea* and *Clematis recta grandiflora* between and near them to loosen them.

In the telling we've left out the part of the bed which we planted first, the back. Going out eastward from our central spires of delphinium are Aster Beechwood Challenger, *Artemisia lactiflora* and for a solid build-up at the end a good big wad of Aster Harrington's Pink. Westward are *Helenium moerheimi*, *Salvia pitcheri*, Aster Mt. Everest with last at the end a fat bulge of Aster Violetta.

Towards the front are two groups of *Scutellaria coelestina* to bring their blue spikes to the August sag. This sag can now be filled with azalea-mums, but since these are so insistent on hiding every leaf with their blowsy blooms I prefer their room to their company. Polyantha roses, World's Fair and Else Poulsen, keep up the tune through August and September until the self-respecting real chrysanthemums bloom.

These are chiefly bronzes and reddish browns: Santa Claus, Mars, Indian Summer and Firelight with the yellows. Algonquin and Golden Lace to light them. Yes, I know what's coming. "Isn't the bed terribly crowded?" It is, but do you remem-

ber the food we put into this soil? Their pantry is well stocked. Then in planting for continuity as well as for mass we selected things that complement each other in bulk, and in time, for instance when *Mertensia virginica* disappears completely phloxes are cheek by jowl with her ready to fill the space. Near trollius also are phloxes, *sidalcea* and so on. Perennials are planted spang on top of tulips and these tulips are not dug up every year. It is surprising how many years tulips go on producing good flowers when there's good rich soil to feed the new baby bulbs each year. By the time tulip leaves are becoming unbeautiful new tops of perennials are coming up to hide them.

Since this bed is a unit, a self border strung along its front is not necessary, so we have a series of low growing things here that give continuity and color. Earliest are *Alyssum saxatile citrinum*, *Arabis alpina*, followed soon by *Iberis Little Gem* and a few lakes of *Phlox subulata lilacina*. Nearby is a group of *Phlox divaricata* beside a patch of dwarf *Dianthus cassinus* and *Veronica amethystina*. Between and immediately behind these front groups we like to have *Petunia Cheerful* or *Salmon Queen*. These are more friendly towards the warm pinks of our phloxes and *Polyantha* Roses than are the rosy shades.

For the first season, and later in gaps occasioned by recent division or mortality we filled up the gap in space

and the August sag with annuals: pink and blue larkspur, *Zinnia Old Rose* and *Enchantress* and with biennials *Suttons Campanula calycanthenia* pink, lavender as well as a few of the glowing purples for carrying effect.

The late summer sag is not quite so hollow if we keep our polyantha roses groomed and fed. Also dividing of *Shasta Daisies* both late and early instead of all at one time lengthens their blooming season well through August, and our stand-by phloxes go on till frost.

One temptation hard to resist is the urge to include a long list of varieties that we have seen and made notes to buy and plant. A legitimate ambition, but we really must refrain from cluttering up this design with them, so we planted them in a trial bed in the cutting garden. In this bed which we see every time we look out from our living room we wanted to avoid a spotty appearance so in no case did we plant less than five plants of a kind (except peony varieties) and for the larger key masses ten to fifteen.

For repetition, so necessary to good design whether of a fugue or a flower garden, we used *Monarda Cambridge Scarlet* confessedly with trepidation for its form has no dignity but its warm color and tirelessness in flowering make it desirable. In a more intimate bed seen at close quarters we might not have dared this.

Now all this bed needs is weed-

Mrs. Marriage, for many years owner of Upton Gardens, Colorado Springs, had experience as landscape architect and horticulturist both in Great Britain and the United States. Her experimental work with alpine plants brought under cultivation became internationally known. She was an early proponent of landscaping with natives. She made the plans for the Opera House Garden at Central City and for the grounds at Horticulture House. Mrs. Marriage wrote for magazines in this country and abroad. This article, reprinted from *The Green Thumb*, May 1949, commemorates our twenty-fifth anniversary, and is representative of her many contributions on numerous subjects including landscape design, shrub selection, pruning practices, and culture of wildlings or cultivated plants.

ing, cultivating and frequent grooming. Cultivating is easy since we keep a mulch of peatmoss on the surface. There is little room for weeds. Grooming frequently: cutting off fading—not faded—flower stems, staking before its need becomes apparent does much for the attractive appearance of the garden.

Such a perennial garden is easily

maintained, but no garden will maintain itself without making some demands on its owner. Now with all this boasting, the bed at this moment needs weeding and edging. There are chrysanthemums to be divided. As-ters to be thinned, self-sown Canterbury Bells and *Sidalcea* for which to find a kind home. Better I stop this futile scribbling and get to work.

Focus on — *Spathodea campanulata*

PEG HAYWARD

Spathodea campanulata is a favorite ornamental of the tropics and subtropics because of its showy clusters of fiery-red flowers which resemble cups of molten lava. The African tulip tree, a member of the *Bignoniaceae*, was first found by Palisot Beauvois near the village of Chama on the African Gold Coast in 1787. The generic name, *Spathodea*, means literally “resembling a spathe,” from the Greek *spathe*, for broadsword, and refers to the ladle-like shape of the calices. *Campanulata*, from the Latin “little bell,” is descriptive of the bell-shaped blossoms.

This West African native is a fast growing, erect tree which reaches 70 feet in height. The main branches grow upright and, as the lateral branches are short, the tree is narrow and slender rather than spreading. The bark is light grey, fibrous and warty. Large leaves, which mass toward the ends of the branches, are compound, and are of three or four pairs of leaflets with a single one at the tip. They are about 5 inches long, dark green, leathery, and marked with conspicuous veins.

The olive-green, velvety, banana-shaped flower buds appear in dense, erect clusters at the ends of the branches. The longitudinally ridged, hairy calyx protects the flower by en-

closing it in a watery juice. Children are quick to discover that the buds contain water under pressure. It squirts spontaneously when a bud is pierced and squeezed, and they often use them as waster pistols. Birds are often surprised if their beaks pierce a bud. It is this peculiarity which has given the tree such names as “fountain tree” or “syringe tree.”

When the African tulip tree bursts into bloom, the branches appear to be tipped by blazing torches. The blossoms open a few at a time from the outer rim of whorled bud clusters. The blooms are about 5 inches long and 3 inches wide. Each irregularly cup-shaped corolla is colored bright orange-red with the delicately fluted margin of its five lobes edged in golden-yellow. The inside of the cup is yellow with red markings and from its center arise four brown anthered stamens. The bloom usually falls to the ground unwilted after a few days, covering the ground with a carpet of color similar to that of its relative, jacaranda.

Seed pods, which are rarely produced, are boat-shaped, 10 or more inches long and 1½ inches wide. When mature, they turn brown and contain many shiny, winged seeds which fall slowly, like feathers, to the ground,



Spathodea campanulata

often being carried a considerable distance.

Native tribes of French Equatorial Africa look upon their tree of fire, flame tree, as an agent of witchcraft and black magic. To them it is the *baton du sorcier*, imbued with the supernatural powers of necromancy. When tribal laws are broken, a string of the blossoms from the tree are laid across the entrance to prevent the felon from repeating the crime. When such a criminal dies, flowers from the flame tree are buried with him to keep his spirit from returning to harass the village. The wood of the tree also furnishes the witch doctors' magic wands, which are waved with great ceremony

over the sick and dying. In certain tribes of the Cameroons, the tribal drums which are beaten to signal war, death of a chief or widespread disease are made only from the wood of the same tree. The leaves, bark and flowers are employed by tribal medicine men in treating skin diseases and internal disorders. The wood, which gives off a garlic odor when freshly cut, is soft and difficult to work. Being fire-resistant, it is sometimes used in Africa for making blacksmiths' bellows.

Spathodea campanulata is of no real commercial value, but is certainly noteworthy as an interesting ornamental tree.

hanging baskets

Eye-Level Gardens

DAVID A. BLADES

YOU ASK, what really is a hanging basket? It's a garden. It does *all* the things a garden outdoors does and takes much the same care. A hanging basket with its beautiful foliage and/or glorious mass of flowers *does* enhance its surroundings, but not without some very challenging and rewarding work.

A "basket" is considered as any container holding suitable live plants and which can be suspended from a strong support. It can be a pot of very fragile

Burro's Tail *Sedum morganianum* or an old bucket with trailing stems clothed with large, attractive fuchsia flowers. Never-ending combinations await those with suitable plants and imagination.

LOCATING HANGING BASKETS

Hanging baskets adorn the areas in which they are placed. They can be located anywhere desired. The atmosphere surrounding a patio, lath house,



Hanging Baskets adorning building

shade tree or indoor garden is immediately sweetened by the presence of a basket. Even a porch or quiet sitting area and especially a home green house or bright plant parlor is beautified instantly. Baskets found in the above places are seen easily to brighten bare walls, accent an aesthetically weak situation or compliment available color schemes. Baskets enlarge planting space, also.

Care should be taken at all times when proposing a site for a hanging basket. Two of the essential elements in basket construction and maintenance, planting medium and water, contribute decidedly to the weight of a basket. A 16-inch basket can weigh up to 50 pounds, just after watering. Therefore, a support capable of holding many pounds is a very important factor to the survival of these living gardens. Heavy-duty eye-bolts, brackets or hooks should be used and at the same time be fastened quite securely to their supports.

MATERIALS NEEDED

We are primarily concerned with hanging baskets as such here and recommend use of the commercially available wire baskets. These are readily purchased for about \$1.00 apiece for a 14-inch basket at any gardening equipment outlet. Available are those with flat or rounded undersides which in turn may have painted or plain metal surfaces. No assembling is necessary, excepting affixing the hanger portion, and often the larger baskets are equipped with a satisfactory hook. Personal choice governs, but, a piece of coat hanger wire is very suitable for making a hook in the absence of a ready-made one.

Proper preparation of planting medium is the basis of success with hanging baskets. Planting medium is a term preferred over *soil*, for many plants

don't require soil at all. Others prefer a small percentage of soil only. Soil, as applied to hanging baskets, is often a completely synthesized entity. Important considerations in choice of planting medium are as follows: should be water retentive, should support maximum aeration, should pack firmly but not be sticky, need not bear any nutritive value of its own.

Retention of moisture can be assured if high quality, coarse, fibrous peat moss is added up to one-third by volume. Presence of air is as vital as water and can be accomplished by addition of one or more porous materials like perlite or vermiculite. Sand is an excellent soil lightener (texture) but adds unnecessary weight. As with the peat, one-third by volume addition of any combination of the above ingredients will suffice. Good garden loam will complete the planting mix.



Columnea verstediana

Epiphytic plants such as bromeliads however, require maximum aeration. Coarse fibrous peat moss, unshredded sphagnum moss and sand each mixed one-third by volume will provide a light (weight and texture), surprisingly perfect growing medium. Cleanliness of any planting medium is important and methods of sterilizing are many. The cautious gardener should familiarize himself with one and use it.

What holds the planting medium and plants in a basket? A product of nature is by far the best liner to use and sheet moss which is harvested from forest floors is excellent. Despite its lack of substance its strong mesh of fibrous-like growth is perfect. Sheet moss dresses a basket in mink. Easy application is a result of the expanse of each piece.

The other natural product is unmilled sphagnum moss, found naturally in bogs. Usually seen in the dry state, it never relinquishes remarkable ability for retaining water. Whereas sheet moss is applicable when wet or dry, sphagnum moss can not realistically be applied when dry. Technique of application will be discussed below.

Implements needed are few. A trowel is useful for scooping soil and its handle is a good tamper. A pencil for proper labeling and a watering device can prove handy.

TECHNIQUE OF PLANTING A BASKET

Consider first the kind of plant(s) to use. The writer prefers using a single kind of plant in each basket.

Baskets can be made with one or two or three kinds of plants. The combination baskets are best outfitted with the pendulous type of plant around the top edge as well as from the sides of a basket while slow-growing, short, colorful plants adorn the top. This article terminates with a list of useful

and delightful hanging plants. The choice of center plants will be left to the discretion and imagination of the reader.

It is important to remember that if more than one kind of plant is planned in a hanging basket, planting medium should meet the requirements of all those plants. Vigorous, robust and healthy plants should be used in any basket-planting venture and their roots should be capable of holding the soil ball together, yet not be so thick as to cause pot-binding. If potbound, the soil ball is damaged and the future health of the plant is jeopardized. Insertion of plants into medium in basket invariably damages the soil ball. To insure proper contact between potted soil and basket medium, *some* damage is the key. Accommodation of entire soil ball will often necessitate change in the contour of that ball.

Experience has shown that plants in 4-inch clay pots provide the better usable plants. Three-inch pots afford less bulkiness; often though, more plants are needed to accomplish the desired effect. All plants should be watered thoroughly a few hours before planting time and be allowed to dry some. If too dry the soil mass will not slip out of a clay pot easily. The structure of too-soggy soil will be destroyed with very little manipulation. This can be disastrous and lead to failure *before* the basket is ever finished. About twelve plants fill a basket nicely.

Begin construction of the small hanging garden by placing the now empty basket, without hanger, on something smaller in diameter than the underside of the basket. This insures protection of pendant plant parts which on planting can immediately descend beyond the bottom of the basket. If the basket bottom is rounded, an old soup

dish works splendidly in balancing the soon awkward mass.

Suggestions following pertain to a basket with one kind of plant and with plants growing through the side of the basket. Remember that the moss must overlap with application of each piece. Either natural liner is easier to use when wet. Sheet moss is readily placed in the basket, but sphagnum requires some skill. Neither liner needs a support between it and the wires of the basket.

Take a moderate amount of sphagnum from which all free water is drained and flatten to equal thickness throughout. Press firmly in the palms to get a working piece. Using a flattened hand, press the sphagnum firmly into the basket. Continue this procedure by carefully overlapping until bottom and one-third of the side all around is lined to about $\frac{3}{4}$ inches thick. Pour the planting medium into the basket and tamp gently but firmly against the liner. The medium should be mounded, the center to one inch above the liner and one inch lower than the liner at the inside edge of the basket. Three plants are inserted in the same plane and equidistant. The upper surface of the soil ball as it was in the pot should adjust to the inside contour of the basket. Feed all plant stems slowly and carefully from inside the basket out until ball is almost touching the wires. Then place small pieces of prepared sphagnum between the newly situated plant and the wires of the basket close to the plant stems. The medium must be tamped firmly around original potted soil while it is inclined downward in the direction of the trailing stems. Two more plants are placed in the same manner.

The liner level is now raised to one inch below top of the basket. The technique is repeated with emphasis



Ivy trained as bells

on the crucial firming of the medium. Each plant, however, is set above and between those plants in the row below. After these plants are in place, the dressing of the basket reaches its final stages. The liner is placed carefully so that it extends ever so slightly above the top edge of the basket. It is important at this time that the moss be pushed together something like moving knitting along a knitting needle. This act assures a firm and tight mesh necessary to keep soil from filtering through after watering. Now plant the last four plants. Place three close to the edge of the basket between those below and place the last in the center in a slight depression or basin. Provided is facility for adequate initial water application with each watering.

Except for the hanger portion, the garden is complete. Attaching the hanger is a simple step, but vital. A pair of pliers is all that is needed. Equidistant points on the top wire of the basket preferably close to the point of connection of a vertical wire are chosen. These points are best located between plants in existing top row of

basket. The hanger wire is bent around the top wire of the basket and then around itself once. Now hang the basket where it can be watered thoroughly.

Initially the basket is best watered gently from the top three or four times, filling the basin or until water drops freely from the basket. It is not wise to submerge a newly planted basket for the medium has not settled and many loose particles might float away. In all cases facilities for catching or draining excess water should be employed.

CARE AFTER PLANTING

At first the basket should be located in a brightly lighted place protected from the sun's direct rays. After a few days, locating the basket depends en-

tirely on the requirements of the plant. Burro's Tail surely needs more sun than plants of the gesneriad family. Care should be taken to see that light reaches the basket from all sides. Development of proper symmetry depends on regular rotation if light is from one side only.

Since growth soon obscures the planting medium, ease in observing moisture content of basket is lessened. Daily inspection is quite essential to the basket's survival. Daily watering may become necessary. Watering with cold or hot water should be avoided if foliage is seen to be damaged easily.

With so many plants growing in a restricted area with no prospect of easy repotting, nutritive requirements of those plants must be met. Any com-



Chrysanthemum baskets at Longwood Gardens

mercial plant nutrient will suffice. Don't experiment by making application a *little* stronger; the entire planting will suffer.

When a synthesized planting medium is used, nutrients should be made available to the plants in about three weeks. Bromeliads in nature receive no one burst of plant food and do therefore require a half-strength application more often depending on the exposure and time of year. With the longer and brighter days, plants are able to utilize more plant food and more frequent nutrient application is possible.

As with the outdoor garden, insects can raise havoc with the beauty and functioning of a hanging basket. Inspect periodically as insect populations can soon become infestations under cover of dense foliage. When and if the time comes to apply insecticides, directions should be followed exactly. Often a list of plant names accompanies directions of application. These plants may be injured or even killed by the particular insecticide. Please respect the directions and suggestions.

Malathion is a good general combatant but has deleterious effects on many, many kinds of ferns. Please be careful!

Although pruning is not as important in inducing flower production as manipulating daylength, regulating water application or withholding nutrients are, it is most important in developing the fullness and pleasing contour of a hanging basket. Only well-established baskets should be put to the shears and the shearer should visualize the desired outcome before one piece of plant is removed. Then pieces should be removed only to help cover thin portions, shorten long stems which are disproportionate to others nearby, or remove unhealthy or dead pieces.



Aeschynanthus speciosus

REPLACING WEAK OR DEAD PLANTS

Only the most vigorous and healthy plants should of course be used initially. If a plant dies outright then it must be replaced. If a plant is weak and is so as no direct effect of insects or disease, be patient for possible recovery.

If replacement becomes necessary, replace plants with a minimum of upset to the basket. Scoop out top plants with a quantity of surrounding soil and add a new plant.

When a side plant needs replacing, some technique is needed. Bend the wires of the basket above and below the plant to make an opening. Tip basket to bring the dead plant upward. As before, scoop out the plant with some surrounding soil. After the new plant is situated and soil is properly firmed, place a good supply of liner to reclothe the area. To preserve the knit, use a *few* large sections of liner rather than many small ones. After the wires have been bent back into place, the basket is ready for watering. If excess water drops from around or near repaired area, small pieces of

liner can be used to improve the supporting capacity. Until a new plant becomes established, hang basket with it facing north.

Some Selected Basket Plants

FULL SUN

Abutilon megapotamicum variegatum

Campanula isophylla

Kalanchoe uniflora

Sedum morganianum

Streptosolen jamesoni

Ceropegia species

Hedera helix varieties

TROPICAL HOUSE

Achimenes — all species and varieties

Begonia foliosa

Bromeliads — many kinds

Cissus discolor and *C. adenopodus*

Columnnea — most species and varieties

Episcia — all species and varieties

Ferns — particularly *Nephrolepis* and *Platycterium*

Manettia bicolor

Maranta massangeana

Pellionia dauveauana

Philodendron — many varieties

Pilea — many species and varieties

Selaginella — many species and varieties

COOL SUN HOUSE

Cymbalaria muralis

Fuchsia — many kinds

Lantana montevidensis

Pelargonium petatatum (one of the best)

Senecio mikanioides and *S. confusus*

Tolmiea menziesi

Vinca major variegata

AVERAGE HOUSE

Begonia

Angel Wing — many types

Rhizomatous types

Chlorophytum elatum vittatum

Jacobinia suberecta

Peperomia fosteriana and others

Plectranthus australis and *P. oertendali*

Scindapsus aureus (Pothos)

Commelinaceae — many genera

Exotics of Colorado — *Crataegus phaenopyrum*

DR. HELEN MARSH ZEINER

THE HAWTHORNS or thorn apples are small trees or shrubs noted for their sharp, often long, woody thorns. Several hundred species of hawthorns are indigenous to North America, with about 150 species of tree size native to various parts of the United States. The majority of the latter are found in the eastern half of the United States.

Hawthorns are also called haws, red haws, and thorn trees. They belong to

the genus *Crataegus*, a name derived from the Greek and alluding to the strength of the wood. They are members of *Rosaceae*, the rose family, and the fruits and flowers resemble those of apples and pears.

Many of the hawthorns have become valuable ornamentals, primarily because of their attractive flowers and fruits.

Crataegus phaenopyrum, the Wash-

ington hawthorn, is considered one of the best of the ornamental hawthorns. Regional horticulturists, including George Kelly, Bill Lucking, and the late M. Walter Pesman, recommend it for the Denver area.



Washington Hawthorne
Crataegus phaenopyrum

The tree has several characteristics which have made it popular.

It is perhaps best known for its clusters of small bright red fruits which hang on the tree until late winter or spring. Because the fruits are only about one-fourth of an inch across, they remind one of holly berries. Close examination shows that they are miniature apples. The tree begins to bear fruit when young.

The leaves are bright green and lustrous. They are broad and flat or somewhat heart-shaped at the base, coming rather abruptly to a point at the tip. Each leaf has from three to five lobes and is sharply serrate. The old name for this species was *Crataegus cordata*, presumably for the shape of the leaf base.

In the autumn, the leaves turn red and later fade to yellow-orange, so that the tree is a blaze of red-orange. The botanical name for Washington hawthorn seems to refer to this trait, since *phaenopyrum* means "like a fire."

Small white flowers, borne in clusters, are attractive in the spring. Their similarity to the flowers of apples and pears shows that they are related to their "cousins" in the rose family.

The size of the tree is a distinct asset to the small-home owner. In its native habitat it may grow to 20 or 30 feet, but in Colorado 15 to 20 feet is the normal height. The tree is slow growing and is said to be hard to transplant. Once established, it does well in the Denver area and is an easy tree to keep in bounds.

Washington hawthorn has rather slender spines, so that it is not as wickedly armed as many hawthorns.

Crataegus phaenopyrum is native from Virginia to southern Illinois, Missouri, northern Alabama, and Georgia. It is said to have been introduced as a horticultural plant in 1738.

It was used on the plantations of Virginia early in the eighteenth century as a hedge for pastures. Hawthorns have been used as hedge plants in the old world for hundreds of years, and the name "haw" is of Anglo-Saxon derivation and means fence or hedge. About one hundred years ago, when hedge fences were common, Washington hawthorn was used for hedges in the middle west.

Washington hawthorn has been used as a pasture hedge fence or barrier, as a clipped hedge, as a windbreak, as a screen, as a copse and as a specimen tree to add a spot of beauty to a lawn or park.

George Washington used this hawthorn and others from the vicinity in his shrubberies at Mt. Vernon, about

1785. The name Washington hawthorn, however, is given to this tree because it is so frequently used as an ornamental in Washington, D.C. It is also known as Virginia hawthorn.

Crataegus phaenopyrum is very popular as an ornamental in Europe, and it is said to be in more general use in the parks and manors of Europe than it is in its native country.

A young Washington hawthorn grew at the west side of Horticulture House at 1355 Bannock Street, where it could be seen from the window of George Kelly's office. This tree was often the subject of comment from visitors to the office who were either seeing this species for the first time or seeing it successfully growing in Denver for the first time. At least some of these people must have been inspired to go home and plant a Washington hawthorn.

A Tribute

Heartfelt thanks goes to two wonderfully conscientious and thorough ladies, Mrs. Bernice E. Petersen, chairman editorial committee, and Dr. Helen M. Zeiner, regular contributor, acting co-editors of the Green Thumb for the past six issues. They contributed all time involved and often the use of private means.

Although having terminated editing duties, they will continue to be involved in the production of this magazine. They eagerly volunteered to acquaint the new editor with all the steps needed to prepare each issue for publication.

Thank you, ladies.

Gladiolus of the Future

ALICE WOOD

HAVE YOU ever felt, in spite of a world full of literally hundreds of possibilities for enjoyment — color television, FM radio, sports, art shows, travel and even participation in such arts as painting or music — that something is still missing? Many of you have partially fulfilled this need with gardening. You have found that the combination of healthful exercise, sunshine, fresh air, and watching plants grow to produce flowers or vegetables is very stimulating.

Many of you like soil, enjoy its smell and like to get your fingers into it. Most of you like to try new things — a red rose, for instance. You buy a red rose bush and it turns out to be a pink one; you are disappointed and take it back. If you try a new pink dahlia, it has to be pink. When it blooms you say, 'See my new pink dahlia; it is as nice as the picture.' Or perhaps you try a few gladiolus, the new All-America selections. You are impressed by their special qualities and you remember the

pictures. You have a good idea that La France will be a lovely ruffled pink and that Chain Blue will be a large beautiful blue. You are delighted when they bloom. They are beautiful, just as they were in the color picture. You show your neighbors and friends your new All-Americas. You may even exhibit them and win a few blue ribbons. You will have fun and much satisfaction and pleasure.

BUT were you *REALLY EXCITED*?? Did you ever go out at midnight with a flashlight to look at the first bloom of a plant you had *bought*? Did you ever get up at the crack of dawn on a summer morning to see your new variety open? Did you ever go out and very carefully try to pry open the petals of a bud because you *ABSOLUTELY* could no longer stand the suspense? — You just *had* to see what that flower looked like inside! Did you ever call your friend ten miles across town at 5:00 A.M. and say 'You would never believe what just opened in my glad garden?! You've got to see it; it's six feet tall, the florets are 7 inches across and it's the most ruffled glad you ever saw. The color is rose and green.' The friend skips breakfast and races across town. You stand in amazed disbelief at this, the only living, blooming plant of its exact description in the world, perhaps in the universe. It has resulted from a cross that you made, and that the Almighty caused a grain of pollen to unite with the germ cell in the ovary of the seed parent to produce this combination of height, color, ruffling and other characteristics. Have you walked down the rows with another hybridizer and looked at the blooms, seeing *not* red like the catalogue showed, or white like the picture, but pink, orange, black-red, smoky and all sorts of rare combinations; flowers that are ruffled, plain, laciniate, large

and small — shapes, colors and combinations never seen before, anywhere?

Such is the excitement of raising seedlings. None are in catalogues. No one has any of them. No one has any pictures of them. They are new varieties raised from seed that was produced as a result of crosses made by placing the pollen of one variety on the stigma of another.

I made my first cross in 1952. I had only a small backyard garden and I had perhaps 20 varieties of glads. Little did I know about the actual crossing procedure. I did know where the pollen is produced and where to put it. I knew enough about inheritance to know that if I crossed two reds, reds would likely develop and if I crossed yellows, more yellows could be expected. That didn't sound very exciting. First of all, I crossed White Christmas (a ruffled white) and Uncle Tom (a dark red). This is written: "White Christmas X Uncle Tom" because Uncle Tom pollen was put on White Christmas. A seed pod was produced and the seeds planted the next spring. The procedure is essentially the same no matter what kind of plant is hybridized, whether you normally see the plants grown from corms or bulbs, rhizomes, cuttings, etc. Except for an occasional sport or mutation, this is the only way new varieties are produced.

The dreary part of hybridizing is waiting for first bloom. Glad seeds germinate rather easily. They normally will not bloom the first year, but do produce corms that must be dug in the fall as all glad corms. These small corms will generally bloom the next year and *each seed* will produce a different variety. Now, two years after the cross, things begin to get exciting!

Here is a cross between a deep blue named-variety with a white star pattern and a ruffled rose seedling whose par-

ent came from that first cross made back in 1952. What color will they be? Will they be ruffled? Will the star pattern be inherited? What kind of spike will they make? Each day the seedlings are watched and finally spikes begin to show. How many buds? Will they be straight? I carefully open the calyx of one and peek in at the lower bud.



Gladiolus HOT PINK

Here is one with plenty of buds, perhaps 19 or 20. That is very good for a first-year bloom. The excitement mounts as the spike stretches and color begins to show. It looks as though it will be ruffled; it is dark and is probably rose or purple. It is impossible to know for sure until the florets open. There is a show next Sunday. Perhaps it will be ready by then. The suspense mounts until I am sure the first bloom will open the next day. I check last thing at night and it is still closed (glads generally open in the morning).

At the break of dawn I wake, rush to the yard to see my (and God's) new creation. It is breathtaking. The color

is a deep rose with the most velvety sheen I have ever seen. It is ruffled; it is needlepoint. And the star pattern? There it is in the form of a white dart tipped with blue on each petal. I have never seen another glad anything like it anywhere. This is it — all of it, the one plant plus a few small ones that grew from the one year cormlets.

I am tempted to put a fence around it. I watched the spike open, finally cut it for the show where it was greatly admired. It was even judged Grand Champion spike of the entire show. This was not a wild dream. It happened here and has been repeated with variations many other places. For each new spike that opens there is an excitement and suspense. When it finally blooms, no matter how many other hundreds have come before it, I feel a special closeness to the Creator of all beauty and a special thrill at being privileged to have had even a small share in working with Him to produce this flower.

The first year I had eight pods of seed. Many plants were interesting. Some of these were used later as parents. I made a few more crosses in 1954 and 1955. One of these actually grew taller than six feet with florets 7 inches across. In 1958 I really became a serious hybridizer, organized my notes, moved to larger garden space and began dumping named varieties to make room for seedlings. About this time Lee Ashley saw all the fun I was having and, seeing the interesting results from my crosses, decided to try it too. By 1963 he had a planting at the Denver Botanic Gardens and I sent out a few to grow at his request. Our plantings increased rapidly and by 1966 my entire test garden including the first bloom "babies" from 1964 was there. It proved to be a very exciting year.

In our crosses we have *both* worked



Gladiolus PINK SMOKE

for beauty first — ruffling, texture, form and color, and, if possible, the necessary mechanical perfection demanded for exhibition. Lee Ashley has worked primarily with white and pink, the most popular glad colors. I have worked for buff, orange, black-red, deep pink, green and rose, the more unusual colors. Lee has worked much more with the miniatures than I.

I feel that we both have been much more than moderately successful and that our choice of parents has sometimes been self-inspired. Hundreds of “dogs” have been discarded, however.

I once had over 60 different varieties from one pod — a gorgeous pod! These I nicknamed my “Fabulous 61’s.” It has been hard to dump any of them and several have been named and introduced. Pleated Lace, Native Dancer, Improvisation and Fluted Sparks and a number of fine ones for building up stock for introduction are all from the one pod. One of the biggest surprises ever produced is being introduced this year — HOT PINK — the brightest, hottest, rose pink imaginable. Its parents were a white, the popular show winner Snow Velvet, and my own 6 foot tall cream, Enchanted Star. Impossible?? No. Improbable?? Yes, definitely. Snow Velvet had the rose glad, Lancaster, for a seed parent and Enchanted Star had the rose glad, Burma, for a grandparent. Neither was as bright as Hot Pink, but the improbable happened. Behold, HOT PINK!

Probably the biggest problem with any hybridizing campaign is selecting the real good varieties and having the

moral strength to dump the others. Believe me, sometimes there are beautiful ones. Similarity to another variety, insufficient buds, poor texture or attachment, undesirable placement — are reasons they may be unfit for introduction. When a plant is “yours,” you know it cannot be replaced. If later you change your mind and decide it has a lot of beauty and is in many ways good, it is very difficult to throw it away. Unless you do a lot of this, you soon find yourself with so many seedlings. If one cannot care for the increasing stock of good ones or find time to flower the corms from recent crosses, and the whole project bogs down. This makes hybridizing a bit sad, but is necessary if one is to continue.

I hope that I have inspired a few of you to try your hand at hybridizing and share in this really exciting aspect of gardening. Choose plants from those holding most interest for you and then contact people specializing in those plants for more detailed help.

If you have questions about glads, write c/o this magazine or look us up when we are in the gladiolus plots at the Denver Botanic Gardens. We invite all to visit our test planting and our seedling show which will be held at the Boettcher Memorial Conservatory, August 17, 1969. Many seedlings will be on display at our August 10, 1969, gladiolus show at the Columbia Savings and Loan Association, West Colfax Avenue and Wadsworth Blvd. These shows are open to everyone. Do plan to visit and see the glads of tomorrow.

AUTUMN BEAUTY FLOWER SHOW

Sept. 5, 6, 7

Westland Shopping Center

DENVER DAHLIA SHOW

Sunday, August 24, 1969

Denver U.S. National Bank

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The Green Thumb

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A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden centers around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

SUMMER 1969



25th

ANNIVERSARY

THE COVER

TWENTY-FIFTH ANNIVERSARY

Montage by Phil Hayward

THE GREEN THUMB

VOL. TWENTY-SIX, NUMBER THREE

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The Green Thumb

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SUMMER 1969

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y becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the se of the books in the Helen K. Fowler Library at Botanic Gardens House.

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Landscaping with Wildflowers

GENE P. MILSTEIN

NOW IT IS possible to fill your planters, rock gardens and even undisturbed mountain acres with beautiful native wildflowers. The cost is reasonable and the applications almost unlimited. Some of the seeds available this season include the Colorado blue columbine, the penstemons, blue harebell, fleabane, Indian paintbrush, pasqueflower, goldenrod, dwarf alpine columbine and moss campion. Seed is available at many of the better nurseries and garden shops throughout the state.

Relatively small quantities of seed can cover large areas at reasonable cost and with minimum care. Once the initial plants are established they will readily spread over large areas and provide a lasting source of beauty within a few years.

The seed can be planted outdoors anytime after the last spring frost until about a month before the first fall freeze. Spring and early fall plantings are most successful, but the seed can be planted during the summer if kept moist and protected from the hot sun. The seed may also be planted in a cool greenhouse or under artificial lights in the basement. Generally, wildflower seed germinates as readily as that of common domesticated flowers. Most varieties also lend themselves to transplanting and do produce hardy perennial plants.

If planted in the spring some will bloom the first year depending on cultural conditions. Those planted in the summer and early fall usually bloom

the following spring and summer. Most species available will do well on the plains, in the foothills or in the high mountain areas.

Many are ideal for metropolitan landscaping and do well in the warm climate of the plains. In addition they give a special accent to home, apartment, condominium, industrial and park landscaping.

Wildflowers fall into two main categories: those germinating easily and quickly and those requiring more patience and special treatment. The first is by far the largest group and its members usually require the same care as the average garden flower. Columbines, penstemons and Indian paintbrush require some special treatment for speedy germination and healthy growth.

This article attempts to discuss all the major aspects of germinating the various wildflower seeds and handling the special problems in more detail. The first method described below is for columbine and penstemon, but applies to any hard-shelled seed that is usually slow to germinate.

Columbines may be started inside or out of doors. Outside, the seed should be kept moist and lightly covered for four weeks or more or over the winter in a protected location. Moisture is quite necessary for seed germination whether in the shade or in full sun. It is recommended to soak the seed in water for a couple days before planting. The only exception to this is: if seeds are planted in the fall for germination following snow melt in the spring.

Seed of the columbine, penstemons and most other wild plants germinate indoors or in a basement in a much shorter period than outdoors, because temperatures and moistness are easier to control. After soaking the seed, it may be placed in a plastic or clay pot or even a cut-off milk carton full of soil. The soil should be thoroughly soaked and drained before seed is sown. Large seeds (columbine) may be covered lightly with soil, peat moss or vermiculite after which both seed and covering should be remoistened. Then cover container with a piece of glass, clear plastic or similar material and expose to indirect sunlight or fluorescent light. Do not place in direct sunlight; excessive heat may contribute to rotting or damping off. As seeds sprout, remove cover glass and expose to full sun. Seed usually germinates within 14 to 18 days if kept moist.

The plants may be transplanted after the first few leaves have appeared. Once established in a permanent location, columbines and penstemons require minimum care and live many years. The only difference between the two is that penstemon seed may germinate more sporadically than columbine seed.

Most of the other wildflowers listed below will germinate under similar treatment excepting pre-soaking. Those marked *sporadic* usually germinate a few at a time; those marked *quick* usually sprout indoors in 10 days or less. Two weeks is usually sufficient for the remainder.

Butterfly-weed (Milk-weed)
(sporadic)

Indian paintbrush (quick)

"Shamrock" alpine clover (quick)

Lambert's red loco (very
sporadic)

Saxifrage (quick)

Lupine (very sporadic)

Moss campion (sporadic)

Yellow evening primrose (quick)

Pasqueflower (sporadic)

Harebell

Goldenrod

Gayfeather

Indian paintbrush is peculiar among perennials. It is very sensitive to transplanting and usually will not survive if the root system is disturbed. Thus, when starting it from seed, place only four or five seeds in each pot and transplant the whole cluster of plants as one, disturbing the roots as little as possible.



Indian Paintbrush

The following is a brief description of the ideal locations and conditions for the various wildflower seed presently available. It is not intended to be complete but rather as a guide for planting.

Columbine Once the plants are established, columbines seem to do equally well in sun or shade, on the plains or in the mountains. Although they may prefer well-drained mountain soil, they will thrive in nearly any

kind. At lower elevations the plants will bloom and seed quicker but may develop mildew and have aphids sooner because of the higher temperatures. But these are not serious problems since they do not usually set in until after flowering and can be controlled by fungicides and insecticides. Columbines are usually found in moist and



"Scotch" Harebell

often shady locations because the seed requires several weeks of moist conditions to germinate. However, after germination the plants can be moved to almost any location.

Blue Harebell These flowers are found from the foothills to the high mountains and seem to grow in almost any location. They bloom from May to August and sometimes into September. They usually grow 12 to 18 inches high and given the opportunity will spread far.

Penstemons These are perhaps the most versatile of the wildflowers. They are found from the plains to the alpine mountain zones. The flowers last

longer in cooler places, but the plants seem to be hardy in most any temperature range. The warmer climate sees the earliest bloom. On the plains they will start in May and June.

Yellow Evening Primrose These flowers, which vary in height to 3 feet, are found from the plains to 10,000 feet in both sun and shade. They are quick to germinate and become hardy perennials blooming after the pasqueflower and other early wildflowers.

"Shamrock" Alpine Clover This is an ideal fast growing ground cover that thrives under conditions where water is available.



Yellow Evening Primrose

Lambert's Red Loco There are many different shades of loco but Lambert's Red is one of the more common. It is found across the plains up to around 10,000 feet and is usually found in the sunny open areas and thrives on a minimum amount of water. The plants are tough and slow growing and the seed germinates rather sporadically over several weeks. It is an ideal rock garden plant.

Kinnikinnick This ground cover is prized for its shiny lush leaves. Wildlife is attracted to its bright orange berries. It has lively small pink and white blossoms early in the season. Once established it is very hardy and will grow on the plains and in the mountains if protected at all times from drying out. It is usually found on sunny hillsides from the foothills to timberline. The seed is somewhat slow



Pasque Flower

to germinate and usually requires freezing for a few weeks before it will sprout.

Pasqueflower (Anemone) This plant is found from the plains to the high mountains and blooms very early in the season. It can be found along roadsides, in meadows or on rough terrain. It is tolerant of full sun or shade and is one of the most reliable wildflowers. The seed germinates sporadically over a long period of time. This characteristic is often an advantage to the survival of wildflowers as it provides for the sprouting of plants with each new rain.

Indian Paintbrush These plants are even more widespread than columbine or penstemon and thrive on dry or moist conditions. However, they are very difficult to transplant successfully and are best germinated in a permanent location. They start blooming in May and June and usually continue throughout the summer until frost.

Aspen Daisy (Fleabane) This plant is primarily found at higher altitudes but will grow well in most locations. Normally it is found in shady places and blooms from mid-summer to early fall. Undoubtedly some varieties are hardier and more versatile than others.

Goldenrod It is an ideal late-flowering plant that is found throughout the Rocky Mountain area and thrives in both sun and partial shade.



Saxifrage

Tufted White Saxifrage This is truly a rock garden plant that lives in the crevices and cracks of rocky terrain. Normally found in alpine regions but also at lower elevations, the plant is noted for its beautiful foliage and ability to grow in improbable places.

PINYON PROBLEMS

JERRY MORRIS

New pests and diseases manage to attack trees and shrubs previously considered hardy and reasonably pest-free in Colorado.

Pinyon pines, important evergreens in contemporary landscape planning, have long been popular for their hardiness under almost drought-like conditions. However, in the past few years in some Denver areas they look sickly and experts have found that they are victims of recently discovered insects. About five years ago a large borer was found in many pinyons in southeast Denver. Although the borer is not known to have killed any trees, it wounds and weakens them, thereby inviting other insects to invade and complicate the problem. This borer stays in one spot on the trunk or on large limbs and feeds on the inner bark causing a wound 1 to 3 inches long and half as wide. A heavy glob of pitch forms to cover the wound and thus protects the larvae. In turn, these larvae hatch in midsummer and continue to feed as weather permits until the following June when they pupate, become adult moths and leave the wound for good. However, damage does not necessarily cease, for a tiny midge often finds a home here, and while living and swimming in the pitch feeds on the edges. While the midge's larvae are present, the wound cannot heal. The tree be-

comes weak and very susceptible to breakage from wind or snow.

Another widespread little insect is the pinyon needle stunt midge which causes needles to grow only about $\frac{1}{4}$ to $\frac{1}{3}$ normal size and then drop prematurely. Its eggs hatch sometime in June and the larvae live within the base of the needles until the following June when they emerge as adults to lay more eggs. Infected needles fall in early June resulting in unsightly "see thru" trees of doubtful value.

In November 1968 still another pest called Prescott scale was found in several areas in Denver and suburbs. Little is known about this insect except that it attacks small branches causing them to die. Larger branches die and finally the tree is lost.

The above-mentioned pests have presented serious problems not encountered before and control measures have not been worked out. Probably another year or more of research will be necessary before a remedy can be recommended.

Pinyon's only previously known invaders were infestations of black or grey aphids which can be controlled with Malathion or water sprayed forcefully from a hose. However, in the future when confronted with a sick pinyon, experts will be less inclined to diagnose the problem as too much water, winter-kill or other easy out.



FOCUS

on

Aleurites moluccana

in the

Boettcher Memorial Conservatory

PEG HAYWARD

Aleurites moluccana, candlenut tree, a recent addition to the Boettcher Memorial Conservatory collection, is the official tree emblem for the State of Hawaii where it is known by the native name of kukui nut. The tree, a member of the *Euphorbiaceae* or spurge family, is of wide geographic distribution. Its generic name, *Aleurites*, comes from the Greek word aleuron, floury, in allusion to the mealy appearance of the foliage of some species. *Moluccana* refers to the Moluccas where the natives sometimes strung the nuts together on pine needles to be used as candles.

The candlenut tree is a rather tall, spreading, evergreen tree. The handsome, irregular crown of the tree often appears whitish or frosted from a distance by the silvery down on the underside of the leaves. The light color is most noticeable in the young leaves about the time the flowers begin to bloom. Large, three-lobed, maple-like leaves may measure up to 8 inches. Two prominent oil glands may be found at the base of each leaf.

The blossoms of the candlenut are not particularly conspicuous. The small, buff-white, five petaled flowers are borne in soft, massed clusters at

the ends of the branches. The flowers are monoecious, male and female flowers appearing separately on the same tree. The staminate, or male flowers, bear about eighteen stamens each and appear on the upper branches. The pistillate, or female flowers, bear a two-celled ovary and appear lower down. The fruits and flowers often hang on the tree at the same time. The pistillate flowers develop into spherical fruits about 1½ inches in diameter borne on a short, thick stock. The outer part of the fruit consists of a hard, green covering about ¼ inch in thickness. Within this is found a thin crust-like shell most easily visible after the fruit has partly decayed. This surrounds the usual single seed. The kernels are poisonous when raw but edible after being roasted. They have a 65% oil (Kelkana) content which furnishes a good varnish-dryer and gives rise to the common name, varnish tree.

Ancient Hawaiians used the oil of the candlenut for cooking, seasoning, lighting and medicine, and made a dye

from the roots to give tapa cloth a copper color. A superior black dye was produced from the soot that collected on pebbles under which kukui nuts had been burned. This dye was used by the ladies of rank for tattooing. Fish nets were often tanned with an infusion of the kukui bark. This preserved the nets as well as stained them a reddish color.

The hard shell of the ripe kukui, after its ridges had been rubbed away with stone, was buried in a marsh to season and blacken. Then it was carefully polished with the large stipules of the breadfruit tree and oiled. These nuts were strung into necklaces or made into other ornaments and worn by only the royal families. Today, in Hawaii the same nuts are made into ornaments and sold as "Black Pearls," a name suitable to its royal background.

Besides being a most attractive ornamental tree, there is little wonder the candlenut tree has been designated the tree emblem of Hawaii because of its many ties with early Hawaiian history.

A SALUTE TO PLANT SALE VOLUNTEERS

A special thank you to the more than 300 volunteers who contributed so willingly and effectively at the 1969 Annual Plant Sale.

With exceptional plants, sunshine, bright weather, a cheerful and generous gardening public, and committees that served most efficiently, little wonder that dollar results were the greatest.

Our sincere thanks to all participants.

DENVER BOTANIC GARDENS

Denver Botanic Gardens Master Plan

*"What could be a finer tribute to a city
and a civilization carving its way of
life out of a near-desert environment
than to build a botanic garden?"*

HUDSON MOORE, JR.

AFTER ALMOST two decades of long-range planning, Denver Botanic Gardens, Inc., is entering the third and most extensive stage in its capital development.

Phase I was accomplished between 1956 and 1964. It included the opening of the York Street Unit and Alpine Unit. Botanic Gardens House was made available for use as administrative headquarters, and a sprinkler system, walls, fencing, walkways, parking area, Children's Garden, and Charles C. Gates Memorial Garden were developed for an outlay of \$183,142.00 of private funds, and \$30,000.00 of city capital funds.

Phase II, 1965-1968, saw the construction of Boettcher Memorial Conservatory, two greenhouses and headhouse; installation of walkways, plantings, and purchase of equipment. In this second phase \$1,051,000.00 from private funds and \$37,400.00 from city capital funds were expended.

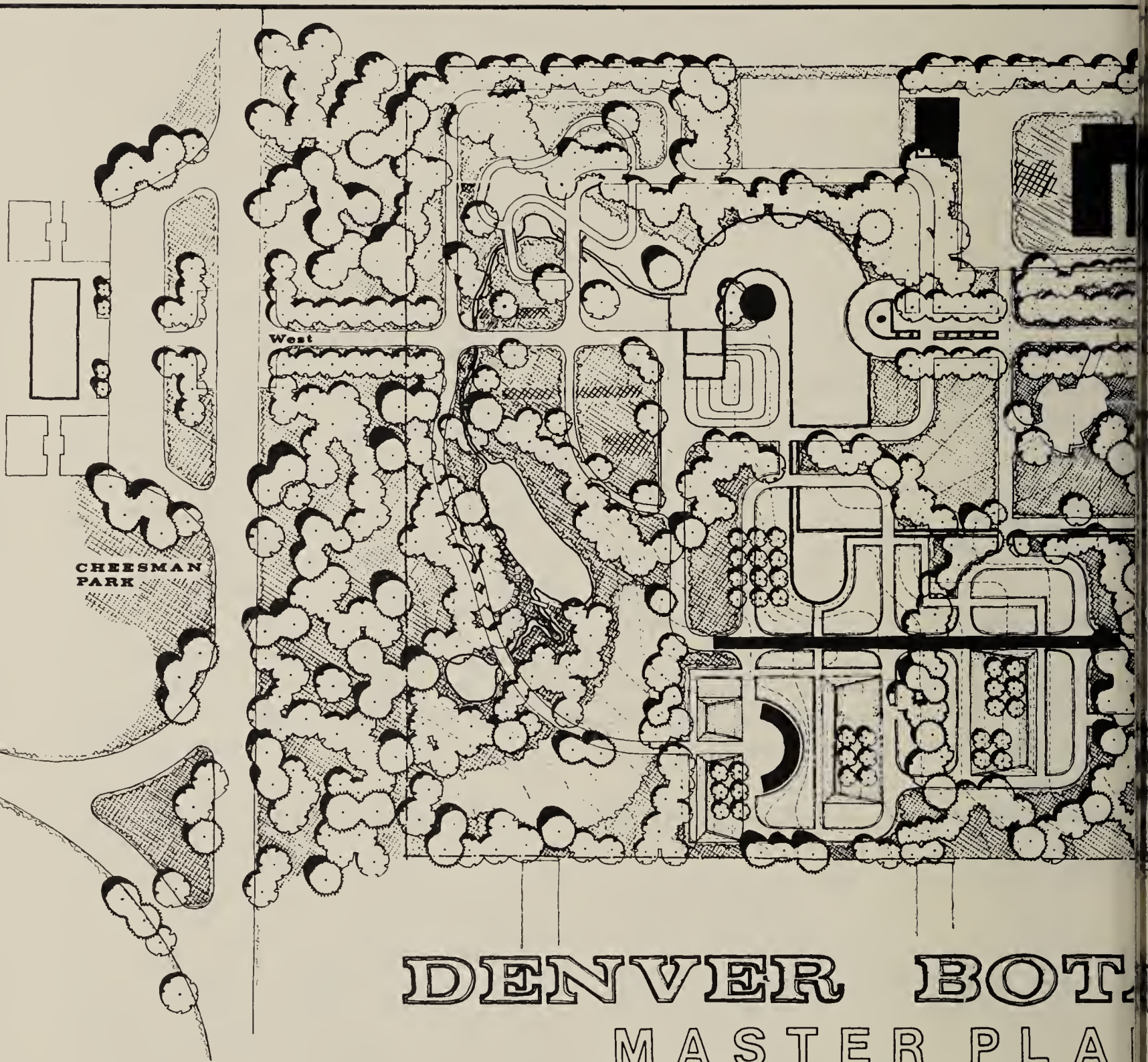
Phase III, to be accomplished in 1969-1970, includes construction of the education building, orchid house, two greenhouses; acquisition of property, and implementation of the Master Plan for development of the York Street site. A large portion of the funds needed for this phase is available now, but an additional \$850,000.00 must be raised from private sources.

The completion of Phases I and II established Denver Botanic Gardens as a modern functioning institution offering plant-oriented opportunities for research, education, and public benefit and enjoyment. The accomplishment of Phase III will provide physical facilities and landscaped features which will further fulfill the purposes of a botanic garden.

Funds for the education building, which will adjoin the Conservatory on the east, have been made available by the Boettcher Foundation. Development of the grounds surrounding the Conservatory-education building complex will require an additional amount.

A campaign for raising \$850,000.00 is being instituted by the Denver Botanic Gardens Board of Trustees.

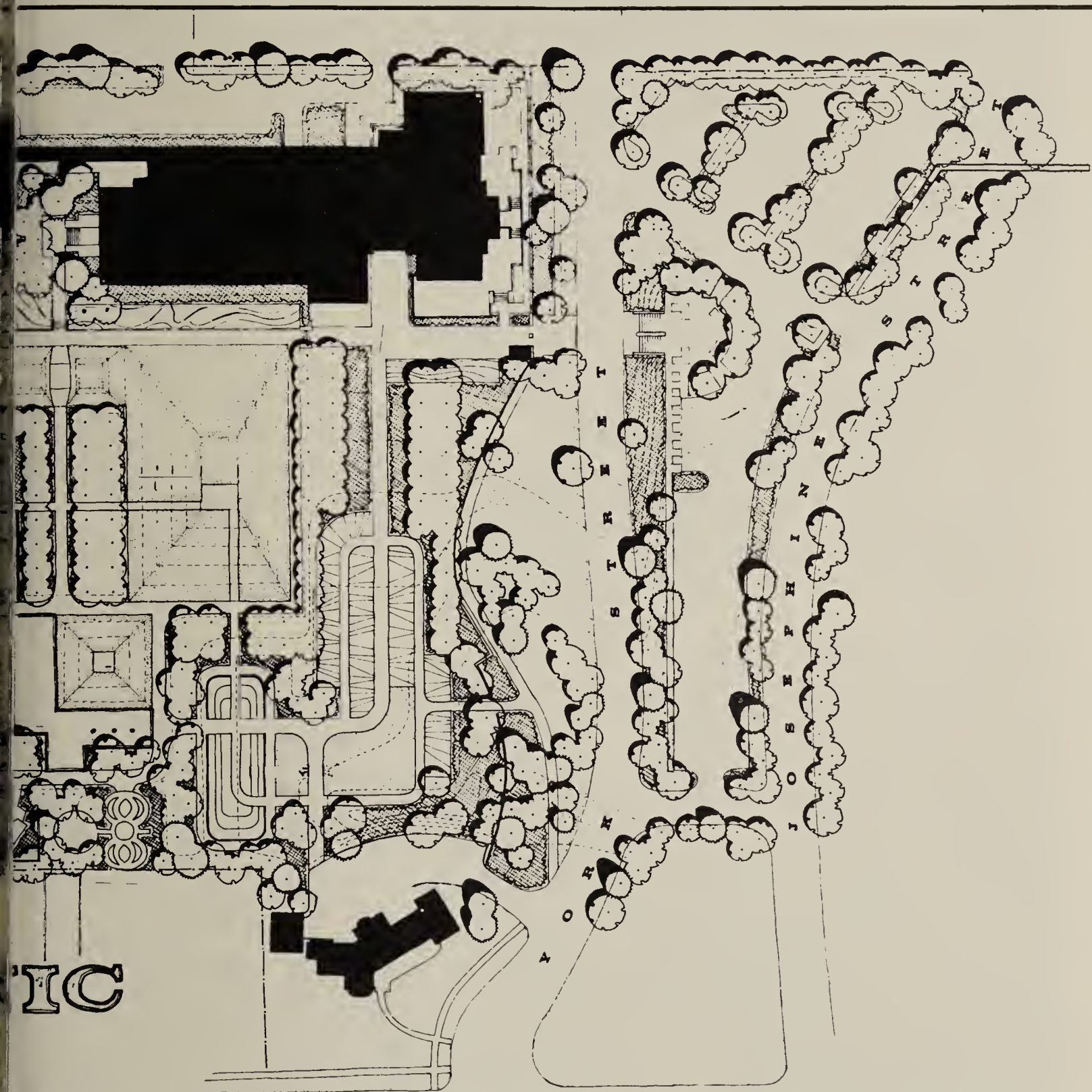
In February, 1969, a Master Plan and Model, accompanied by a report prepared by Eckbo, Dean, Austin & Williams, landscape architects, was approved by the Denver Botanic Gardens Board of Trustees and the City and County of Denver. Design structure and design elements were explained in the report. Design structure covers plant arrangement, layout of paths and passageways for practical and aesthetic purposes, and water movement following varied characteristics of architectural form and naturalistic line.



DENVER BOTANICAL GARDEN

MASTER PLAN

ECKBO DEAN AUSTIN and
Landscape Architecture Planning
145 Mission Street San Francisco



I A M S
Design
33-1484

Scale
0 40 100
North ↑

Design elements include an entrance kiosk, annual and perennial display plots, lakes and water channels, herb garden, demonstration gardens, Gates Garden, Japanese garden, test plots, a Plains Garden, a viewline, demonstration area for lectures and exhibits, and a multi-use area appropriate for concerts, art shows, special exhibits. Parking and Children's Garden may be relocated.

The Denver Botanic Board of Trus-

tees will develop a detailed program for implementation of the Master Plan, which will determine content and activities of the landscaped areas, priority listings, and development schedule. The work will progress gradually in stages, and the architects recommend that rough grass be planted where plots are not included in immediate development.

ALICE WILLIS

TODAY'S FLOWERS

LEE J. ASHLEY

IN A BOOK published in 1615, we find drawings made by Francisco Herhandes and a brief history of the Acocotli or Cocoxochitl, names given by the Aztecs meaning "Water Pipe". This is the first recorded history of our dahlia. It was named dahlia in honor of Andreas Dahl, a great Swedish botanist living in Berlin.

By the 1800's the dahlia had reached great abundance, and in France the dahlia craze became almost as great as the tulip mania in Holland.

Here in Colorado we have grown the dahlia for a long time and find it to do well. We get clean, bright colors here that are stronger than in most other areas. The bright sun does cause some burning and fading but this is usually minor. The dahlia likes a good rich soil that is well drained. They prefer full sun and plenty of water. We find it is helpful to put a stake in when the tubers are planted. This gives them

support from the wind and encourages them to greater height. The addition of super phosphate and muriate or sulphate of potash will help to give stronger, healthier plants. A summer fertilizer or top dressing should be given around July 15th. A 5-10-10 is usually good for the plants in the Denver area.

The dahlia has long been a favorite of flower shows and this year we should have one of the best dahlia shows ever held in Colorado. It will be held Sunday, August 24 at the Denver United States National Bank from 2:00 to 6:00 p.m. We are hoping to have over a thousand blooms ranging from the miniatures to huge ones over a foot-across. Colors will be from pure white to the black-reds and all colors in-between. There will be an arrangement section telling something of the history of the dahlia and showing the beauty of this wonderful flower.

FIRST PRIZE WINS FIRST PRIZE



THERE IS ONLY one All-America Rose Selection for 1970. It is First Prize, a deep rose-pink hybrid tea. This rose is a hybrid of the late Eugene S. Boerner and is the fourteenth of his many originations to have won the AARS award.

The extra long 3 inch buds, classically urn shaped, open to full blown

blossoms of 5 to 6 inches in diameter. The fragrant deep pink petals have a satiny texture. The inside of these very large petals is a lighter, almost glowing pink, giving the open flower a distinctly bi-color appearance.

The bushy plants are comparatively small averaging 30 to 36 inches. The deep green leathery foliage is highly re-

sistant to disease. The dark coloring of the foliage makes an excellent background for the intense pink of the blooms.

The family tree of First Prize is exceedingly complicated and includes some of the most honored, and at the same time, widely varied ancestors a rose could have.

Its great grandparents include the 1950 AARS winner Fashion, a coral pink floribunda; Independence, a scarlet floribunda and enchantment, a pale pink and gold bicolor hybrid tea. First Prize probably inherited its bloom size and superb foliage from one of its grandparents — Golden Masterpiece, a

yellow hybrid tea. The “father” of First Prize is hybrid tea Revelry. This rose is rarely found in commerce but is widely used in hybridizing because of its long beautiful bud form.

How First Prize ever turned out to be the pure deep rose-pink color seems quite amazing considering the great mixture of colors and rose types in its ancestry. The matter of how these diverse colors and characteristics combined to form First Prize is largely a mystery even to hybridizers, as no two experts will agree on how characteristics come to be transmitted to succeeding generations of roses.

PSYCHEDELIC GREENHOUSE

A psychedelic greenhouse may sound more mod than scientific, but Kenneth Goldsberry is using the psychedelic colors for research.

Goldsberry is an assistant professor of horticulture at Colorado State University. His study in the greenhouse, which is paneled with colors ranging from hot pinks to electric blues, is concerned with the wavelengths transmitted by the colored fiberglass covering.

“For many years we’ve known that certain wavelengths are more beneficial to plants than others. Researchers have grown plants from algae to tomatoes and have found that blue and red wavelengths are most beneficial.”

Through the use of a spectroradiometer, Goldsberry has screened a series of fiberglass samples made especially for CSU. These samples allow the most beneficial light wavelengths to pass through in different quantities.

The experiment is based on research that has been done with colored fluorescent tubes and light filters. Pre-

vious experiments showed which wavelengths were most beneficial to growth.

“We’re using the same principles but are substituting solar radiation that is transmitted through fiberglass reinforced plastic for the fluorescent tubes,” Goldsberry said.

“We’re trying to find a greenhouse covering which will allow light transmission for specific purposes. For instance, red supports plant elongation or rapid, long growth, and blue causes vegetative breaks with many branches,” Goldsberry explained.

The program will screen the various colors used on the greenhouse to see the effect on the plants. Pinto beans and tomatoes are being used in the research because these plants have been used in previous experiments and the results can be compared. Marigolds are being used to find the effect on flowering plants.

Because of the high amount of sunlight in Colorado, transforming solar radiation to beneficial wavelengths for plant growth should be profitable to Colorado greenhouse owners.

Annual Terrace and Garden Show

JANE HARPER



THE Denver Botanic Gardens Guild will hold its Annual Terrace and Garden Show on Thursday, July 24, from 10 a.m. to 8 p.m. A highlight of the tour this year will be a luncheon from 12 noon to 2 p.m. at Kent School, 1004 E. Quincy Ave. It will be catered by Chef Leo. Lovely hand-thrown ceramic pots planted with garden herbs will adorn the luncheon tables. These

pots will be sold on the day of the tour.

The eight gardens are located in Denver's southern suburbs. In capsule form, the gardens:

Mr. and Mrs. Edgar Britton — 6427 S. Hill, Littleton. An attractive gate invites you into this charming yard filled with bronze sculptures by Mr. Britton. This delightful residence will be open so that visitors can enjoy a mag-

nificent collection of East Indian sculpture and two unusual side rooms: one features many tropical plants including bougainvillea, and the other, a Japanese ofuro bathroom.

Dr. and Mrs. Reid Johnson — 7137 S. Windermere, Littleton. A winding stream trickles through a rock garden, under a bridge and into a pond where ducks and fish reside. From an island cabin, there is a magnificent view of the front range, making this five acres a lovely setting for a country home.

Mr. and Mrs. Victor Dunham — 6740 S. Steele, Littleton. A stone retaining wall provides a terrace for a great variety of plants that thrive in Colorado. Climbing roses, a lily pond and a cactus garden are a few more of the delights in this owner-maintained garden.

Mr. and Mrs. Ross Lahr — 3559 E. Easter Ave., Littleton. Roses, Roses, Roses. There are seventy-five bushes to be exact. Mr. Lahr is one of Colorado's rose experts; he'll be present on the 24th to answer your questions. Mrs. Lahr will open a basement room to display her many varieties of African violets. She, also, is an expert in her field and will be available to answer any inquiries.

Mr. and Mrs. Bruce Taylor — 3250 Cherryridge Rd., Englewood. A lanai, attached to this ranch-style house with definite Oriental feeling, features a Japanese garden around a swimming pool. The large expanse of well manicured back lawn is enhanced by flower beds ablaze with lavenders and reds.

Mr. and Mrs. Thomas Keesling — 3220 Cherryridge Rd., Englewood. Native conifers, shrubs and trees are used generously around this attractive brick home. Brick, also, is used extensively on walkways and on the circular patio that looks down over a rock garden and a swimming pool. A play area, a shuf-

leboard court and a dog run are tastefully incorporated into this backyard.

Mr. and Mrs. Edward H. Honnen — 13 Lynn Road, Englewood. A circular driveway with a Colorado sandstone retaining wall is an impressive entrance to this property. As you approach this attractive contemporary house, be sure to note the grove of aspen trees. The sweeping mountain view can be enjoyed from a brick patio that has an adjoining rose garden.

Mr. and Mrs. Esdras K. Hartley — 4200 E. Quincy Ave., Englewood. An old refurbished carriage house makes a charming country home. There is much to see on these three acres: two espaliered trees off a trellised patio, horse pastures enclosed with white thoroughbred fences, planting beds filled with herbs and cutting flowers are outlined with old railroad ties, and brick walkways leading everywhere unify the varied landscape.

From the Hartley property you can take a leisurely stroll along the tree-lined Highline Canal to Kent School, where you can enjoy a delicious lunch by Chef Leo. For \$5.00, you can see the eight gardens and have lunch at Kent School. To visit just the eight gardens purchase a \$4.00 ticket. Tickets are available at the gift shop in Boettcher Memorial Conservatory, 1005 York St., telephone: 297-2348; at Botanic Gardens House, 909 York St., telephone: 297-2547 or through any member of the Denver Botanic Gardens Guild. Tour tickets will also be available at the individual gardens on the day of the tour.

Bus transportation for the tour of the gardens will be available in the morning from Botanic Gardens House. For information regarding cost and departure times, call Mrs. William Russell, 777-4777 or Mrs. Frederick Tossberg, 756-7329.

PROPAGATION OF BLUE SPRUCE FROM CUTTINGS

MICHAEL ULASKI*

THE PROPAGATION of Blue Spruce from seed, layering, or grafting has been practiced for many years. It was believed that these were the only profitable methods for reproducing this species commercially.

With the introduction of the mist system of propagation, Spruces, as well as many other ornamentals, now can be rooted from cuttings.

The procedure is practically the same with most ornamentals propagated under mist, except that more care is taken in timing the cutting of Blue Spruce.

At Denver City Park Greenhouse the mist pipes are buried about six inches deep in a good grade of white, sharp sand (or plaster sand). The system is constructed of ½-inch tubing, regular or copper pipe, spaced about 20 inches apart and raised about 15 inches above the sand bed. A mist head is placed on each pipe. The least expensive brass head is suitable.

Cuttings were taken the latter part of December from the finest "blues" available. The trees were growing in very dry soil because of the mild winter. Cuttings were between 6 and 7 inches long, and taken below a node. Cuttings taken with a knife were more successful than those obtained by pulling and leaving a heel. The growth area from which the cuttings are made seems to determine the percentage of success in rooting. Cuttings of terminal growth are quite difficult to root, but the cut-

tings on both sides and behind these lead shoots (usually six in number) root more readily. Cuttings taken even closer to the main trunk and growing up from the branch, if only ¾ to 1 inch long, will root almost a hundred percent.

Dipped in Hormodin Jiffy Grow No. 2 for 5 seconds, the cuttings then were stuck into the propagating bench. Jiffy Grow was mixed 1 part to 10 parts water, but can be used full strength for hardwood and other difficult-to-root cuttings. The cuttings were dipped 1 inch deep and planted 1¼ inches into the rooting medium. When all stock was planted the entire bed was thoroughly soaked. The mist clock was set at 3 seconds out of 3 minutes with intermittent mist from 8 a.m. to 5 p.m.

The rooted cuttings were carefully potted in gallon cans the first week in March. Young spruce roots are brittle and are easily broken. Since the roots were 6 to 7 inches long, transplanting should have been done earlier. The potted stock was returned to mist conditions for about a week and then transferred to the lath house when weather was more settled.

Unrooted cuttings may be stuck back in the propagating bench. Some varieties are probably more difficult to root than others.

*Superintendent, Denver City Park Greenhouse.



Bush Morning Glory, Ipomea leptophylla.

Photo by R. J. Niedrach

Nature plays weird jokes, and the weirdest of all is to inflict death for being unfit.

DESERT FIESTA

By D. M. ANDREWS

This is one of several manuscripts given us by Mary Andrews which were written by her famous botanist-nurseryman husband prior to his death in 1938. The story of his life was given in the May 1944 Green Thumb. Here is horticultural wisdom from Colorado's number one plant lover. Ed.

PLAYTIME comes to the desert once in each calendar of months. It is fiesta or festival; also it is flower time and the world is gay with color. Back of it all is a lesson of thrift.

Nowhere does the wearing of holiday apparel become a rite so much as in the desert. Primitive peoples, used to inclemency, observe festal customs ceremonially. But the employment of thrift to provide against sudden need is as ancient as the desert sands.

Coming into the desert at blossom



Darwin M. Andrews

time one is struck with a sort of incongruity between superb flowering and wizen vegetation. There is a prevalence of contracted foliage or no foliage; of thorns, often with hooks or barbs; of stature shortened or grotesquely misshapen. One cannot escape the conclusion that such features are the record of deprivation long continued and relentless. Nature plays weird jokes and the weirdest of all is to inflict death for being unfit. Survival, even though marked with the scourge, brings the inspiring picture of courage and carrying on.

Flowers such as these and prolific fruition are the culmination of a definite course of events. The Indian, true to his race-old traditions, ends the tribal ceremonial which marks the initiation of their young braves and immediately novitiates enter training for the event a year hence. But the annual cycle of desert plants is a far more ancient heritage.

Thrift implies a conservation of resources, and the most precious substance of the desert is water. Food there is in abundance, but the roots of the plants require it in solution. The cactus supplies the classic example connecting the past with the present under the most difficult of living conditions. And what have we? A green body laced with a beautiful pattern of protective spines, effective against assault except by heavy hoofs. Foliage is usually wanting—the green stem structure serving in its stead. A compact reservoir of food and moisture is conserved by a

THE GREEN THUMB

firm skin against evaporation. It receives and never gives out the materials of its substance except for the process of growth, flowering and maturing of fruit. It exhausts much of its substance during this period so that it passes into a dry autumn with contracted tissues, able to withstand ordinary winter rigors with immunity. Its first sign of activity of the new year is not growth but a replenishing of its bulk by absorption from melting snow, or rain of early spring. Growth of the cushion types is merely a budding process with the production of new spines and a circle of flower buds.

In the rather small northern species of cactus found in Colorado this is quickly accomplished and the flowers immediately follow. Seeds sometimes ripen quickly or ripening may be deferred till autumn or even until the next year. The growth of the cushion types is probably very slow, for the reason that a permanent shrinkage below, each year offsets part of the terminal growth.

The flowers of many cactus are exceedingly showy but are often lacking in fragrance. The visitation of bees and wasps in search of pollen

trips the sensitive stamen filaments so that they close over the pistil, showering visitor and stigmas alike with pollen.

How the cactus got its form would be worthy of a Kipling to explain. Perhaps no explanation is best, lest we become skeptical of what we see. It is a marvel of adaptation and no innovation, because we are unable to reverse the process any more than to change the butterfly back to a caterpillar. In the tropical jungle a certain relative of the cactus is an extensively climbing vine with broad green leaves. Only a wild flight of imagination can picture the steps required to change one to the other.

Colorado has no true desert. This does not deny a most interesting desert flora, more varied in fact than the desert affords. The high mountains, retaining snow from winter to winter, temper the climate three ways. Excessive heat is subdued; they promote rainfall and radiate streams of water; they increase humidity. Portions sufficiently arid to be quite realistic remain, and these are varied by soil conditions and altitude. Even the mirage with its strange witchery lures and deceives, displaying its shimmering pretense of placid water where the thirsty sands are hottest.

Towering yucca and columns of cactus are entirely absent from the Colorado landscape. So, too, the century plant with its candelabrum of bloom; the ocotillo with its flame-tipped wand; the creosote bush beautiful to look upon but aloof with its acrid odor. These and many others are unable to face subzero winters of Colorado's latitude and altitude. Throughout Colorado, extending to middle elevations, hardy forms of yucca and cactus, denied the longer growing season of the South are content with smaller stature size. In their flowering and neat thriftiness there

Prickly Pear Cactus, Opuntia vulgaris





Large Evening Star, Mentzelia decapetala.

Photo by R. J. Niedrach

is no evidence of present hardship of deprivation. Their adjustment seems perfect. The absence of extreme desert conditions appears a grateful relief to yucca and cactus alike. The cushion types of cactus favor rocky eminences or stony ground where they can root deeply in pockets of good soil. The opuntias are not so selective and thrive about equally on slopes or level stretches of sand or adobe. Only the tree cactus (op. arboreous) attains the dimensions of a large shrub.

Little if any true acclimatization is possible among desert plants. For this reason their preference in respect to habitat must be considered carefully. The first and most constant precaution must be to avoid too much moisture. This not a platitude nor is it entirely relative. It is based upon a possible rainfall of 8 to 12 inches per year, or in drier sections up to 18 or 20 inches, and much of that

Pineapple Cactus, Sclerocactus Whipplei
(Opposite page)



limited to a few months of late winter and spring.

Where rainfall exceeds this amount by three or four times there is perhaps no option but to make use of a steep slope or wall or the edge of a terrace supplying also a soil which will drain quickly. This is not as difficult as might first appear. Even in a level garden a part of the rockery section may be sufficiently elevated to provide just the conditions required if full sun is also available.

The gradual drying off and sun-baking of a cactus in the summertime has been second nature so long that it has usurped first place and has become a habit. Plumpness is attractive and satisfies our sense of well-being. But a cactus too well fed up to the approach of winter will find its sense of well-being badly misused before spring.

Other desert plants become dispeptic if offered too frequent refreshment or too rich a diet. The common symptoms are a flabby or flacid growth with lippy stems and a weak or negative effort at flowering. Flowers if produced are lacking in brilliancy and the plant is condemned both for habit and performance. This laying bare of family secrets is not intended to provoke gossip in garden club circles, but rather to insure for the host of beautiful desert flowers a reception at once sympathetic and cordial.

The charm of desert flowers is so often in generous display with economy of herbage. Two or three of the Evening primroses (*Oenothera*) have a flower diameter of two to four inches and a total height of less than 10 inches. In color they are white turning to pink and yellow aging to scarlet.

The sand lily of the dry foothills has grass-like rosettes mingled with crystal white flowers of amaryllis-form continuing for several weeks. The

nariposa lily of dry slopes of foothills and mountains waves on slender stems a heavy blossom or two of white or pale lilac. The most glowing cactus able to survive sub-zero cold is the Turk's Cap (superbum) forming mound-like growths of many heads with a multitude of large trumpets of waxy scarlet. In addition lemon, chrome, orange-yellow, pink, rose, crimson and green completes the color range of Colorado cactus blossoms. White and deep blue delphiniums and a number of delightful pentstemon belong to the semi-arid zone along the foothills. The evening star (Mentzelia), bush morning glory (Ipomoea), and wild four-o'clock (Mirabilis multiflora) are glorious desert plants of rather large growth and impressive when in flower. Five species of yucca are indigneous and hardy and two are small enough to be considered for the rock garden. Lewisia rediviva, with its big pink stars, grows at the edge of dry gravelly mesas. It should be stored in an upright position in dry sand until October.

Shrubs of miniature and of larger size can be added to the list. There are cliff ferns and mosses (selaginella) and other plants attractive for their foliage, some evergreen, some silvery gray and of varied form. Rock gardens of America need variety of material, relief from the commonplace; just what these plants can give. They are beginning to be listed by progressive dealers though it is doubtful if all of them will be immediately available.



*Mr. Andrews, pioneer botanist (1869-1938) probably achieved greater success in introducing Rocky Mountain native plants to the world than any other horticulturist of this area. In 1893 he began collecting specimens in



Pincushion Cactus, Mammillaria

Photo by C. J. Ott

northern Colorado; later his plants, reliably named, were sent to England, Scotland, Europe, China, Japan. The Arnold Arboretum sent him on botanical trips to Colorado, New Mexico and northern Texas.

He founded Rockmont Nursery in Boulder where he domesticated native Colorado plants and shrubs, including penstemon, coralbells, cacti and mountain privet for use in home gardens. He developed French hybrid lilacs on their own root systems for Colorado landscapes and introduced a number of peonies, lilacs, iris and phlox; Colorado Snowcap, the outstanding white phlox, was his introduction. His seedling iris, Candlelight, received the highest rating in the American Iris Society's Symposium. A birch, poplar and other natives were named for him. An internationally recognized authority on rock garden plants, Mr. Andrews was awarded the honorary degree, Master of Science, by the University of Colorado a few years before his death.

"Desert Fiesta" was published posthumously in September 1948 by his widow, Mary W. Andrews, and is reprinted in commemoration of the twenty-fifth anniversary of *The Green Thumb*.

The Eleventh International Botanical Congress

WILLIAM A. WEBER

THE ELEVENTH International Botanical Congress will meet in Seattle, Washington, from August 24 to September 2, 1969. This is only the second time the Congress has met in the United States. The first time the meeting was in Ithaca, New York, in 1926. Historically these congresses were held principally to find some way to achieve international agreement on the rules governing botanical nomenclature. The rules, as they stand today, with minor modifications, are those adopted at the Congress of 1930 at Cambridge, England, and nowadays the Botanical Congress has expanded much beyond the business and nomenclature (a few days of the Congress still are devoted to nomenclature) and consist of symposia and contributed papers dealing with every phase of botanical research. The last Congress held in America was the 1959 meeting at Montreal, and the most recent Congress was that of 1964 in Edinburgh, Scotland.

For many people, the highlight of the Congress is to attend one or more of the field trips that are held before, during, or immediately following the Congress. In 1959 there were exciting trips in Canada, to the Canadian Rockies, the Pacific Coast, the subarctic near Hudson's Bay, and a ten-day flight to the islands of the "real" Arctic. Of course, there are plenty of opportunities to meet and discuss matters with colleagues during the meetings themselves, but the field trips are times when people can meet on com-

mon ground with the plants which interest them and they can determine whether they are really talking about the same things. New acquaintances thus blossom into life-long friendships, correspondence, and mutual help with each other's research and teaching.

An International Congress is a very expensive matter, especially for European botanists, and doubly so if the Congress is to be held in the United States. Many of them have great difficulty in getting here on their limited funds and because of visa troubles, and many who plan to come suddenly find at the last minute that for some technical reason they are unable to make it. The field trip committee, therefore, tried to find a way to make the Congress more attractive by setting up the field trips in such a way as to possibly save money for the visitors. Instead of bringing them to Seattle and then taking them on long field trips which would return to Seattle, several of the longest field trips have been set up so as to pick up a participant at one of the three International airports and transport them to the Congress *by way of* the field trip.

Therefore, it should be especially interesting for the Denver and Colorado friends of botany to know that the longest field trip of all, Number 1, will begin from Denver. On July 30, a total of 42 foreign and American botanists will arrive here. The friends of the Botanic Gardens are arranging a welcome and dinner for these people, and will

have an opportunity to meet them individually. On August 1 a caravan will take them to the summit of Mount Evans for a foray including Mount Goliath and Summit Lake. On August 2 the group will begin the long bus tour, which will take them to Gunnison, Durango, Mesa Verde National Park, Monument Valley, Grand Canyon, Zion National Park, Death Valley, the ancient bristlecone pine trees on the White Mountains of California, Yosemite National Park, Stanford, San Francisco, the Redwood Highway, Crater Lake, the Columbia River Gorge, and then finally the trip will end at Seattle for the beginning of the sessions.

The participants in this field trip will come from many parts of the world, and only a few of them have ever seen the Rockies. We will have colleagues attending from Australia (5), Finland, France, Germany, Italy, Brazil, Canada, Madagascar, Sierra Leone, England and Belgium.

The United States Post Office plans

to release several stamps commemorating the Congress.

The success of this Congress is going to depend on the hard work of a great many people, from the professional botanists who have given their time, without compensation, to see that everything goes off well, right on down to the enthusiastic amateurs and friends of botany who are helping out in the small details of meeting people at airports, giving them private field trips around the local areas, and generally making them as welcome as possible in a strange country. Bettie Willard, as co-leader, has done much of the heavy work of planning Field Trip No. 1, and we will have able assistance during the actual journey by Miss Miriam Coulson of Boulder, and Dr. Stanley Welsh of Brigham Young University. We are expecting to have various people join us from time to time en route to interpret areas which are their particular specialty. It ought to be a great prelude to a great Congress.

EXOTICS OF COLORADO

DR. HELEN MARSH ZEINER

Clematis paniculata, sweet autumn clematis, is a popular fall-blooming vine. Although a very common plant, it is exotic to Colorado and, indeed, to the entire North American continent.

Other common names for *Clematis paniculata* are Japanese clematis, Japanese virgin's bower, and small-flowered Japanese clematis. These names reflect the origin of this exotic, which is a native of Japan believed to have been introduced into culture about 1864.



The plant produces great quantities of delicate, fragrant white flowers in large panicles. Each flower is about an inch to an inch and a half across. The flowers are produced in such profusion that the vine is a solid mass of white bloom from August or September until late fall. Sweet autumn clematis is said to be the most prolific bloomer of all the ornamental clematis vines. It will bloom in sun or half-shade.

After the flowers fade, the vine will be covered with fluffy, silvery seed heads.

When not in bloom, the vine is desirable because of its dark green, glossy leaves. Each leaf is composed of 3 to 5 leaflets which are often lobed. Individual leaflets can vary from 1 inch to 4 inches in length. Leaves hang on very late in the fall, and the plant is in fact semi-evergreen.

Clematis paniculata is very easy to grow and will become a very large, dense vine 20 feet or more in length. It is necessary to prune this vine to control it, and it is suggested that in the spring one should cut back one-third of the last year's growth as well as removing any weak shoots.

Sweet autumn clematis is often used as a screening plant for patios or porches or along fences. It is sometimes used as a ground cover.

A number of other clematis vines, including the ever-popular large-flowered purple clematis, are desirable or-

namentals. They are exotic to Colorado, and several of them come from China.

Four species of *Clematis* are native to Colorado. Wild flower lovers are familiar with the bushy leather flower (*C. hirsutissima*), also known as sugar bowls and old maid's bonnet; the purple or blue rock clematis (*C. columbiana*); the small purple Rocky Mountain clematis (*C. pseudoalpina*); and the western virgin's bower or old man's beard (*C. ligusticifolia*), a variety with small white flowers. An interesting clematis which is not native to the state but which escaped from cultivation many years ago and has become naturalized is the yellow-flowered oriental clematis (*C. orientalis*). Watch for this in the Idaho Springs area.

The genus *Clematis* is a member of the *Ranunculaceae*, the buttercup family. This family contains many ornamentals such as peonies and anemones as well as many wild flowers. Colorado's state flower, the columbine (*Aquilegia coerulea*), belongs to this family.

Clematis paniculata was used effectively at Horticulture House, 135 Bannock Street, where it was grown on the north fence next to the walk that led from the house to the parking lot in the rear. Many readers will remember the mass fragrant white bloom that completely hid the fence and transformed it into a thing of beauty.

THE LEGENDARY ORIGIN OF THE ROSE

Ancient legends relate to the origin of the rose. One legend informs us that Flora, being grieved at the loss of one of her favorite nymphs, implored Jupiter to change the dead body of her former companion to a living flower of surpassing beauty, hence the rose. Another states that the rose sprang from the tears of Venus as she wandered in search of her lover. The ancient Turks declare that the rose was born from the drops of perspiration that fell from the brow of Mahomet. According to Greek myth, it was the red rose which sprang from the blood of the wounded feet of Venus as she ran searching through the woods for a fallen friend.

Tropical Insect Traps

DAVID A. BLADES

ONE of the most interesting tropical plants, a true silent denizen of the deep rain forest, has green leaves. BUT, these leaves are so unlike those of any other plant both in form and function. From the end of the leaf blade is born a pitcher-like appendage (a very complicated structure), and when filled with water is a successful insect trap. *Nepenthes* is the only genus in the family Nepenthaceae and is commonly called the Pitcher Plant family.

The genus was given by Linnaeus alluding to a statement in the "Odyssey," where Helen drugged the wine cup in a manner that its contents freed men from care and grief. *Nepenthes* comes from the Greek for *without* and *care*.

Nepenthes are shallowly rooted plants, and by using a very tenacious tendril-like affair, an extension of the midrib, between the leaf blade and the pitcher as a holdfast (and for support of heavy pitchers), can easily attain heights up to 70 feet. They climb up into the tops of trees where both crown and pitchers are displayed to unwary insect visitors.

Each pitcher is actually a greatly expanded and hollowed out end of the midrib. The top edge of each pitcher is thickened into a collar-like rim which is striated from inside toward the outside and is quite smooth and shiny. The midrib ends in a spur on the far side of the pitcher rim proximal to the insertion of the pitcher lid.

Insects — mostly running — are attracted to the vicinity of the pitchers by sweet exusions on the lower surface of the blade, on the tendril and just below the pitcher rims. In haste to reach the attracting substance, insects

slide off into the liquid and are actually digested by a peptonizing fluid. The final product is readily assimilated by the pitcher wall. It is apparent that the catching of insects aids in the nutrition of both wild and cultivated plants. The flowers are inconspicuous and are usually removed from cultivated plants.

Pitcher Plants are native to southern China, northeast India, the Philippines, the East Indian Islands, and in northeast Australia while most are found on the Malay Peninsula. About twenty-five percent are found in hot, steamy swamp conditions while most of the others are found from 1,000 to 10,000 feet on the western sides of mountains in the above areas. These areas are almost constantly shrouded in dense mist.

The Botanic Gardens received cuttings of several species and hybrids of *Nepenthes* last October, and propagating them on to healthy plants is an experience. A clean cut is made on each cutting, the base of which is dipped into rooting hormone powder. They are then inserted into inverted 4" pots, the drain hole having been enlarged about three times. Sphagnum moss is packed around the stem inside the pot until the cutting is firm. All but the base of the cutting is covered, for the roots form mostly on the very end. All cuttings are placed in a closed container (small box covered with plastic) at 80° to 90° day and night. When rooted, they are potted in a mixture of one part osmunda fiber, one part peat moss, ½ part sand and ½ part sphagnum moss. They are grown in a humid greenhouse with a minimum night temperature of 60°.

Our *Nepenthes* should warrant display at some near future date.

OUR GARDEN WASN'T IN THE BUDGET

By MYRTLE ROSS DAVIS

THIS is good advice for all new home owners on how to have a garden with little expense. Note that Mrs. Davis saved, not by ordering "bargains" from unknown out-of-town firms, but by growing plants from seedlings or cuttings. Editor.

During the first years of our married life, when the depression was on and our children were young, we didn't have much money to spend but we just *had* to have a garden. Our enthusiasm could be compared to that of opera lovers who hear their opera from the edge of a top gallery seat. We had to hold down the expense but we enjoyed our experience just as much as if we had had parquet seats.

Our garden had small beginnings and it took several years to materialize but the years rolled by quickly and we had real pleasure in watching our little seedlings, root sprouts and cuttings grow into a beautiful and useful garden. We felt that these plants, like our children, were really ours for we had raised them from tiny things. Each one had a history and they meant so much more to us than if we had bought them as large plants.

We were very careful not to fall for the pretty pictures in the eastern catalogues or bargain advertisements—we couldn't afford to waste our money—so when we bought anything we were sure that it was good and that some local nursery or seed store stood behind our purchase.

By studying the articles in garden magazines and attending some lectures on landscaping we learned about garden design. We found that a real garden was an out-door living room,

enclosed so that outsiders couldn't look in. This meant that we must have tall shrubs around the outside border. Then, of course, we knew that we should have color harmony, balance and unity in order to create a beautiful picture.

We also thought that our native plants had a place in our garden and were fortunate in having a friend who owned a mountain ranch which



had a large variety of trees, shrubs and flowers. He invited us to take anything we wanted for our garden so we transplanted dogwood, thimbleberry, chokecherries and sumac.

One of our finest trees, Bristle-cone pine, was salvaged from a new road grade. It was to be destroyed and we were given permission to save its life. Luckily, we had a burlap sack in our car so that we could take it with a ball of dirt and not expose the roots. One year we bought two matched Junipers in pots and used them for twin Christmas trees. We

didn't keep them in the house too long and soon after Christmas planted them in our garden.

One day in early spring, when our garden was young and barren, I was walking through a nearby park. I saw some root sprouts and seedlings of lilacs, honeysuckle and snowball being dug up and thrown on a trash pile to burn. I wanted them for my garden so I timidly asked the gardener if I might take them home and try to make them live. Of course, he gave them to me and most of them lived and fulfilled their purpose in our tall shrub border.

We bought some inexpensive hybrid tea roses and some climbers but the majority of our roses were grown from stem cuttings. We kept these under jars slightly shaded by other bushes until they had grown enough roots to keep up with the evaporation. If we started our cutting in the fall we kept the jars on until the next June.

Of course, we had those perennials which spread rapidly from their roots and are exchanged among friends and neighbors. Phlox, Shasta daisies, day-lilies, chrysanthemums, lily of the valley and many others come in this class. We had good luck growing delphinium from seed, if we planted it as soon as it was ripe in July or August. We found that the seeds dry out and will not germinate if they are kept around the house long after they are taken out of the seed pod. We also grew Violas, Painted Daisies and Lilies from seed. It was a good inexpensive way to get some choice varieties.

All the trees we had were grown from seedlings. They were a Black Walnut, Quaking Aspen, American Elm, Ash and some Russian Olives.

In the back part of our yard we had a picnic ground equipped with



a fireplace. A few flat rocks from a rock slide, an old fireplace grate from a remodeled house and my husband's masonry did the job. Our family and friends loved the informality of outdoor meals and parties and the fascination of cooking over an open fire.

The ash pit, though a very practical structure in those days, made an unsightly corner in our picnic nook so a little lattice screen was made to hide it. In the opposite corner to balance it, we built that little lath house that I had longed for in which to raise tender primroses and ferns and start seedlings that needed partial shade.

As you expected, we had a rock garden. Like most rock gardens ours wasn't a perfect specimen of landscape architecture. The rocks should have been larger but we were limited by what we could load in our car. They, however, were all the same kind (lichen-covered granite) and they made a good home for our little sedums, saxifrages and sempervivums. A basin shaped rock made an efficient and well-attended bird bath.

Our rock garden furnished a back

ground for our lily pond. The pool was small, just large enough for one water lily plant and was the result of one bag of cement and robbery committed on the baby's sand box.

A flagstone terrace next to the house seemed necessary to us but we found, to our sorrow, that flagstones were rather expensive. However, one day during a walk in the foothills we found some exposed stratified sandstone. The next weekend we got busy and peeled off enough flat rocks to make our terrace.

Our garden, as you can see was built slowly but it was quite satisfactory from the standpoint of beauty and utility. The trees grew large enough to give us plenty of shade and we enjoyed a sense of seclusion from our tall shrubs. It was an interesting and enjoyable experience and later, when we moved to a larger home, we built a new garden and we have used much of the valuable first hand experience we gained from our first little garden which was built with a lot of work but very little money.



*Mrs. Davis contributed numerous articles to *The Green Thumb* on a variety of subjects — indoor and outdoor gardening, Colorado wildflowers and their culture. A charter member of Colorado Forestry and Horticulture Association, she served on several committees including membership and Garden tours. She was active in Home Garden Club of Denver, Denver Orchid Society, a talented flower arranger and popular speaker on garden topics.

"Our Garden Wasn't in the Budget" was published in *The Green Thumb* in January 1951 and was selected for reprinting during this, our twenty-fifth anniversary year.



Welcome to the Delegates Of the Eleventh International Botanical Congress



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The Green Thumb

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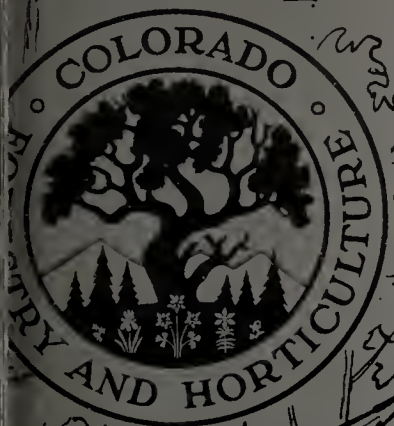
A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden centers around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.



The Green Thumb

AUTUMN 1969



25th
ANNIVERSARY

THE COVER

TWENTY-FIFTH ANNIVERSARY

Montage by Phil Hayward

THE GREEN THUMB

VOL. TWENTY-SIX, NUMBER FOUR

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The Green Thumb

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AUTUMN 1969

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By becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the use of the books in the Helen K. Fowler Library at Botanic Gardens House.

For further information write to Membership Chairman, Botanic Gardens House, 909 York Street, Denver, Colo. 80206, or call 297-2547.

Culture of African Violets

EMMA LAHR

THE AFRICAN violet is the most popular of all houseplants. It is hardy, easily grown, and blooms the year around. It responds to intelligent tender loving care and adapts easily to varied growing conditions found throughout the world.

The variety of violets is endless. The blossoms are single, double, semi-double, star-shaped (or double stars), fringe edged, edged with white, green, gold, red, blue or pink. Blossoms come in all colors but yellow. Now that there is a green blossom, which carries the yellow gene, it is expected that some day there will be a yellow violet. The leaves vary in color from light green to dark green, some are variegated with white, cream, pink or bronze markings, and others backed with red. Leaves may be tailored, ruffled, spoon-shaped, long and narrow, round, oval or heart shaped. The edge of the leaf may be scalloped or serrate. Some leaves resemble a strawberry leaf; some are thin and delicate; others are thick and hairy. A boy leaf is the term applied to a tailored leaf. A girl leaf has a light-colored area at the base of the leaf, and is often scalloped at the edge. "Boy" and "girl" have no other significance.

You have tried to grow violets and failed? Most *growers* lose plants now and then! Chances are, one of the following is the cause: neglect, insects in the soil, dust clogging pores of leaves, insufficient water, overwatering, lack of vital nutrients, overfertilizing, chilling or cold drafts, lack of humidity,

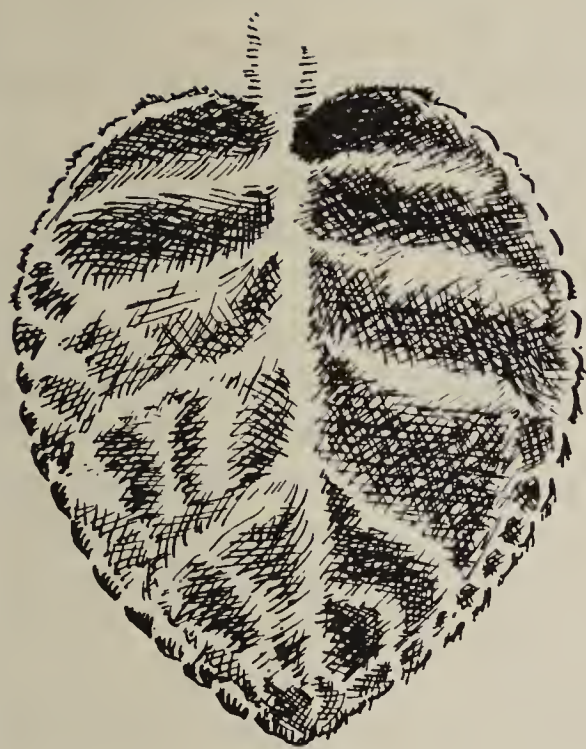
excessive soil acidity or alkalinity, temperature too warm or too cold, poor drainage, too little light or too much sunlight, fumes of gas, too much fluorine or chlorine in the water, water which is softened chemically, or spray injury.

Anyone can grow beautiful African violets by providing the conditions needed for healthy growth. The first essential is consistent care. A plant watered too often one week and neglected the next week cannot survive. Tropical then desert conditions do not suit violets; don't gather them in the bathroom when you shower. Violent contrasts are to be avoided.

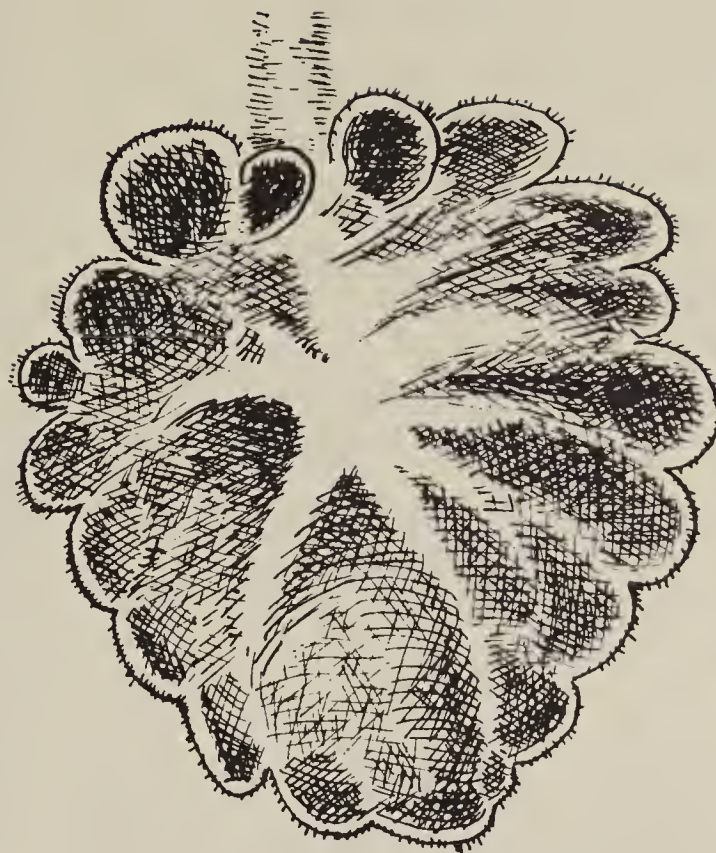
The essential factors for growing a beautiful violet are: right light, proper watering, adequate fertilizing, optimum temperature, high humidity, fresh air, good soil, enough space, cleanliness of plant, pot and shelf, spraying as a precaution against disease and good grooming.

Violets require strong light, but not direct sunlight. A sheer curtain or a tipped venetian blind will protect plants from sun. Any exposure is all right, though one does not worry about the sun with a north exposure. Intense light will cause the petioles to be shorter, the leaves to turn down around the edge of the pot, and the center leaves to bunch and curl up. Blossoms will hide under leaves. Insufficient light causes long petioles, the leaves to grow up instead of lying flat, and causes a spindly plant without blossoms. Natural

Some African Violet Leaves



Boy or Tailored



Girl



Ruffled



Spooned



Supreme or Amazon



Single

light can be supplemented by lamp light for a few hours in the evening. Plants thrive with fluroescent lights as the only source of light. Lights are placed so that the bottom of the tube is 16 inches above the shelf and lights are turned on 12 to 14 hours a day. Violets need a period of darkness to use the food manufactured during the day. Gro-lux lights are rich in red and blue. Under Gro-lux lights root growth takes place more quickly, young plants grow very quickly, and consequently, more frequent watering and fertilizing are required. Mature plants do not bloom well under Gro-lux. A combina-

tion of cool white and Gro-lux or a combination of daylight and warm white works well for mature plants. Violets tend to grow toward the light, so the plant must be turned often if it is to grow symmetrically.

Always water with warm water, for water too hot or too cold will cause spots on the leaves. Water when the soil feels a little dry to the touch. Should water be spilled on the leaves, blot immediately with a damp sponge. The natural sponge bought at a cosmetic counter works best. A paper towel or tissue will leave lint on the leaves. Should a violet be overlooked at watering time and become limp, set the pot in a bowl of hot water with the leaves supported.



Double star



Double

The amount of water and the frequency of watering vary with the size and kind of pot, variety and size of plant, temperature, soil, humidity, and intensity of light. A violet in porous soil in a clay pot will require watering every 3 or 4 days; in a plastic pot, every 4 or 5 days; in a wick fed pot, every 5 or 6 days. If bottom watering is your choice, water occasionally from the top to prevent an accumulation of mineral salts on soil surface. Be con-

sistent in watering. A plant allowed to become too dry will drop its lower leaves. Rain water, well water, melted snow, or any water free from chlorine will produce more flowers. More plants die from overwatering than from lack of water. Learn to listen to your plant, to observe its needs, and give water as needed.

Plants as well as humans like to eat regularly. A balanced fertilizer, one-fourth the recommended strength, can be used each time the plant is watered, used half strength once a week or, at the recommended strength once in two weeks. It is a good idea to alternate fertilizers, but not more than three kinds. Foliar feeding produces excellent



Back of Double Star

results; use a very weak solution and be sure the leaves dry in a darkened room free from drafts.

Violets like a temperature of 70 to 75° with a 10° drop at night. They will withstand temperatures of 85 or 90° or higher provided the humidity is increased and good circulation of air is provided. They will endure a temperature of 60° for a short time, but will not bloom again nor prosper if the temperature goes below 60°.

Providing humidity of 40 to 60%



Star

is not easy in Denver. Buds will drop unopened if the atmosphere is too dry. Humidity can be increased by placing plants on plastic lined trays containing wet sand, vermiculite, perlite or crushed granite. Use enough water to keep the crushed granite moist, but not so much that plants absorb it from the bottom. Add household bleach to the water in the trays occasionally to prevent the growth of algae. Grouping several plants together also helps to increase humidity. In Denver's low humidity, leaves give off moisture



Semi-Double

faster than the roots can take it up from the soil. A fog applied with a mist sprayer will raise humidity. Keep plants with wet leaves out of the light until they have dried.

Violets need fresh and freely circulating air, but no drafts or direct cold air. Without some circulation they suffer from mildew and crown rot.

Recipes for soil mixes are almost as numerous as cake recipes. The results you get from your mix indicate whether it is right for your growing conditions. A good soil for violets has the following characteristics: has good drainage, remains loose and porous and does not pack, contains organic matter for holding moisture and nutrients, is slightly acid with a ph of 6.5 to 7, and is free of insects and diseases.

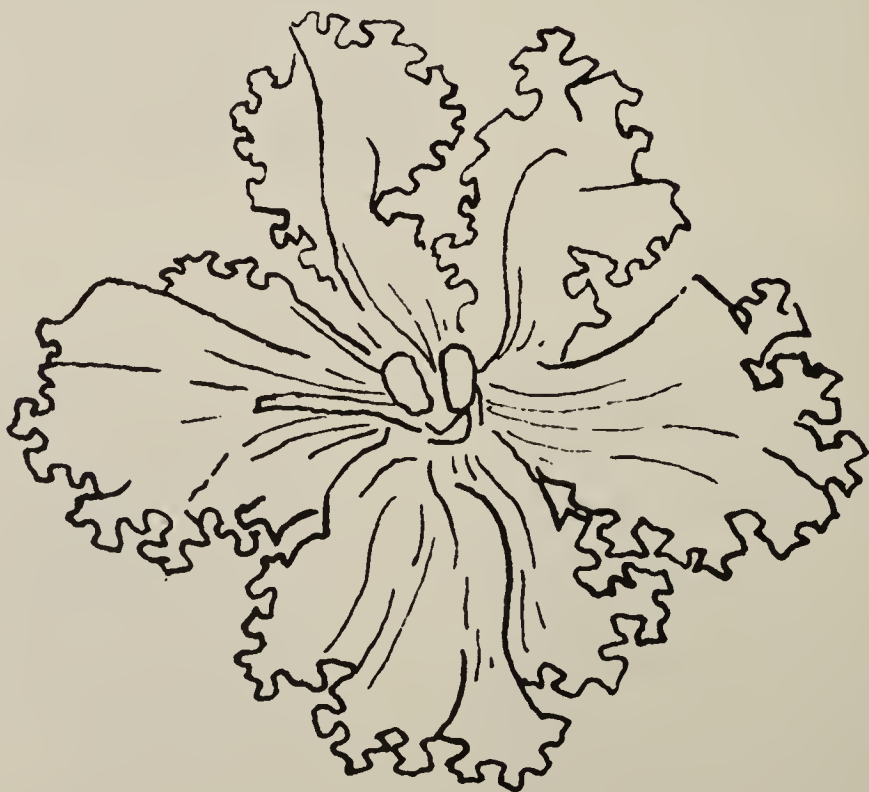
Plants must have ample space to develop good symmetry. Crowding

plants together promotes the spread of disease, insects and mildew.

Clean foliage is a necessity for a healthy plant. Leaves get dusty and dirty as does everything in a home. Weekly spraying with warm water keeps leaves clean. Use a clean, sterile pot when repotting. Boil the rocks on which pots rest at least twice a year, or flood the rocks with an insecticide, after removing the pots. Be sure the benches are kept clean.

A regular spray program as a precaution against disease is essential. A miticide, a fungicide and foliar fertilizer may all be combined in a weekly or bi-weekly spraying with a fine mist sprayer.

As violets are watered, pick off the old blooms or those past their prime, remove dead or limp leaves, and with a soft brush, remove soil from leaves.



Ruffled Edge



Colored Edge

Violet growers strive to grow a perfect violet with leaves flat and straight out like the spokes of a wheel. The layers of leaves should overlap like a rosette, so that looking down at the plant one cannot see stems, soil or the rim of the pot. A plant whose blooms are bright and clear in color and number 20 or more according to the variety is desired. A plant which is clean and free from disease and marred foliage, and which has a glowing look of health is ideal.

Recent studies show that plants have qualities of extra sensory perception and are aware of the attitudes of the grower. So talk encouragingly to your plants and praise them for their beauty.

For more information write to: African Violet Society of America, P.O. Box 1326, Knoxville, Tennessee 37901. Many books about violets are available in the Helen Fowler Library at Botanic Gardens House.



Two-tone

DENVER BOTANIC GARDENS WELCOMES ANDREW R. KNAUER



Horticulturist, landscape architect, project developer and manager, teacher, writer, and outdoor sportsman, "Andy" Knauer joined the staff at Denver Botanic Gardens September 22, 1969, as Assistant Director.

He came to Denver from Ohio, where he was born, grew up, and was educated. His interest in horticulture began at an early age in elementary school programs and in his parents' garden.

After completing high school he worked for tree servicing companies, then established his own tree and landscape business just prior to being inducted into the Army the same year. He served for two years in the Army Medical Corps, eighteen months of which were spent in Korea.

Knauer received a Bachelor of Science degree in Agriculture from Ohio State University in 1956 with a major in ornamental horticulture and a minor in landscape architecture and botany. While in college he worked part time for tree and landscape contractors and for nursery and garden store operators.

After receiving his degree, Knauer was employed as landscape designer, supervisor of nursery, tree moving and arboriculture crews, and served as project manager on major landscaping projects. During this three-year period he received two national landscape awards for industrial landscape designs.

His next employment, of about three years, was as arborist for the Cleveland Electric Illuminating Company, working on a community service project known as the "Master Street Tree Plan Program," where tree planning and consulting services were provided to municipalities in northeastern Ohio.

In 1961, Knauer was retained as horticulturist in Kingwood Center, Mansfield, Ohio. His responsibilities included management and design of floral displays, plant collections and flower shows. In this job he added still another facet of horticultural activity to his already sizable background of experience. He designed, wrote, and composed the publications of Kingwood Center which included "Kingwood Center Notes," the official publication. He also instructed classes in landscape design and various gardening subjects.

In 1964, he was employed as director of the Garden Center for the Garden Forum of the Greater Youngstown Area and also became horticulturist for Mill Creek Park's Fellows Riverside Gardens. As director he presented programs on gardening and landscaping to the membership and public. He also aided in the development and coordination of programs and services of the Fred W. Green Memorial Garden Center. As horticulturist, he supervised the design, construction, maintenance and records of the Fellows Riverside Gardens and surrounding area.

Knauer is a member of American Horticulture Society, American Association of Botanical Gardens and Arboreta, International Shade Tree Conference, International Plant Propagators Society, Garden Writer's Association of America, American Rhododendron Society, and Men's Garden Clubs of America. He has contributed articles to the journals of these organizations and to various other horticultural media.

He and his wife, Nova, have two children and a dog. The family enjoys outdoor sports as a group, especially ice skating. Nova uses her artistic ability on display art but confesses that her strongest inclinations are toward domesticity. Daughter Patty is enrolled in Bowling Green University, Ohio, and son Bill is a junior at George Washington High School in Denver. Knauer's own hobbies include hunting, gun collecting, photography and, according to his own statement, work. Whether Mandy, the African Basenji dog, has any hobbies she wouldn't say, since Basenjis don't bark—even though they can.



Exotics of Colorado—

Euonymus

DR. HELEN MARSH ZEINER

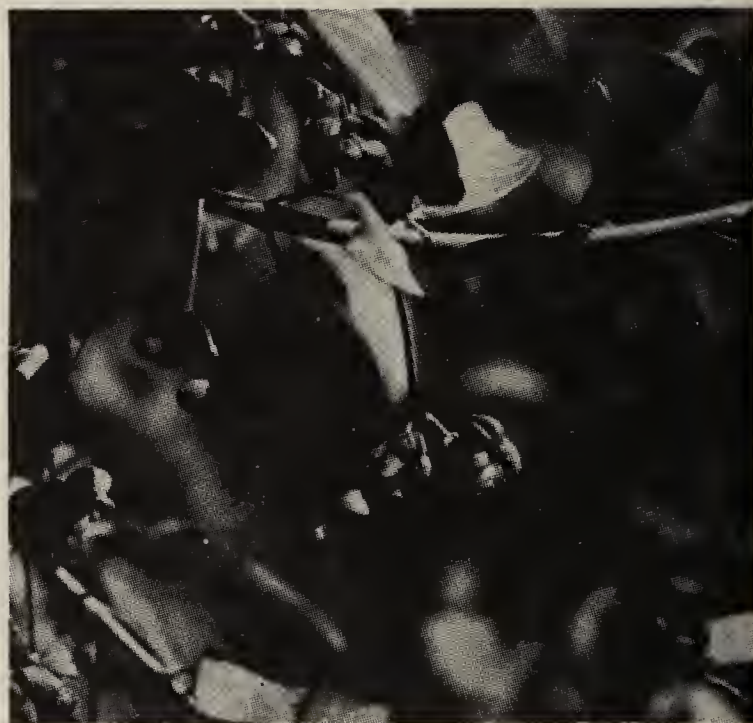
THE GENUS *Euonymus* (family *Celastraceae*) includes a number of attractive and useful shrubs or small trees. Some are low-growing evergreen shrubs or climbers; others are deciduous and are tall enough to be classed as large shrubs or small trees. The deciduous species are valued for their ornamental fruits and sometimes for the fall color of their foliage. Some have interesting corky-winged twigs.

Mrs. G. R. Marriage, the landscape artist who drew up the planting plan for Horticulture House at 1355 Bannock Street, thought so highly of this group that she included three species of *Euonymus* in the plans.

One of these was the evergreen *Euonymus radicans vegetus*, known as the bigleaf wintercreeper. Although included with shrubs, bigleaf wintercreeper is low and spreading and will climb on stone or brick.

Suggested uses for this species include: as a ground cover, to hold soil on banks, for foundation plantings with evergreens or other taller shrubs, and for low hedges if trained on a wire. It is fairly tolerant of shade.

Euonymus radicans and its many varieties come to us from China and Japan. *Euonymus radicans vegetus*



Euonymus Fruit Capsules

was introduced in 1907. The varieties vary from one another in matters such as shape, coloration and size of leaves, and habit of growth (upright or procumbent).

The variety *vegetus* is a low, spreading shrub which under ideal conditions can attain a height of 5 feet. It usually has prostrate branches at the base and makes a dense growth.

The thick, evergreen leaves are broadly oval to almost round. The margins are crenately serrate, which simply means that they are edged with rounded teeth.

The flowers are small, greenish-white, and are borne in slender-stalked 5- to many-flowered cymes. They are followed by pale pink bittersweet-like fruits.

Euonymus europaeus and *Euonymus atropurpureus* were the other two species selected by Mrs. Marriage for use at Horticulture House. Both are large deciduous shrubs or small trees, very different in appearance from the evergreen *Euonymus radicans vegetus*.

Euonymus europaeus, European burning bush or European spindle tree, is native to Europe and western Asia. It has been cultivated for many, many years. In the eastern United States it has sometimes escaped from cultivation and become naturalized.

It is an erect shrub or small tree which may reach a height of 20 feet. The leaves are ovate to oblong-lanceolate, crenately serrate, and from 1 to 2½ or 3 inches in length. The leaves turn purple-red in the fall.

The yellowish flowers are borne in few-flowered cymes. The typical 4-lobed capsules are usually pink, although there can be variations from pink to red.

Leaves, bark and fruit are said to be violent purgatives, and it is reported that in Europe children, as well as sheep, goats, and cattle, have been made ill from eating these parts.

On the good side of the ledger, the wood of *Euonymus europaeus* has been used to make spindles for weaving, butchers' skewers, and artists' charcoal.

Euonymus atropurpureus, burning bush or wahoo, is a native of eastern North America where it can be found growing in stream beds or moist, fertile woods. Its range extends from Ontario to Minnesota and southward to eastern Virginia, Tennessee, Arkansas, and Oklahoma. It has been under cultivation for over 200 years.

The leaves are elliptic and bluntly toothed. They are larger than those of the European burning bush, varying from 1½ to 5 inches long. They turn pale yellow in the fall.

The flowers are purple in many-flowered cymes. The fruits are crimson-red and very showy, particularly after the leaves have fallen.

It is said that this species was named burning bush by the Iroquois Indians. The Dakota Indians called it wahoo, which means arrow wood and alludes to the use this tribe made of the fine, hard-grained wood.

The leaves, fruit, and bark of this species *also* have purgative properties. The bark has been used medicinally.

The wood, like that of *Euonymus europaeus*, has been used for spindles, skewers, and artists' charcoal.

There has been some controversy about the name *Euonymus*. The old spelling was *Evonymus*, and this is still found in some books. *Euonymus* is now the accepted spelling.

There is also some discrepancy as to the spelling of the species name. The "eus" ending with *Euonymus* is now accepted (*Standardized Plant Names*). The "ea" ending sometimes seen should be used with the spelling *Evonymus*.

The species name *atropurpureus* means dark purple; *europaeus* means European; and *radicans* means rooting as it creeps.

The name *Euonymus* is derived from Euonyme, the name of the mother of the Furies in Greek mythology. Some interesting stories concerning this name and its meaning and some interesting Indian legends about the origin of the plant can be found in *Shrubs in the Garden and Their Legends*, by Vernon Quinn. This book is available in the Helen Fowler Library at Denver Botanic Gardens.



Creeping Euonymus

Fruits of all species of *Euonymus* bear a resemblance to the fruits of bittersweet. This is a natural family resemblance since bittersweet, *Celastrus scandens*, and *Euonymus* both belong to the family *Celastraceae*.

Colorado has two representatives of this family in its native flora. One is *Pachystima*, mountain lover or boxleaf, a low-growing evergreen shrub fairly common in the mountains. The second is *Forsellesia*, greasebush, a small somewhat spiny deciduous shrub with gray-green leaves, found primarily in the southwestern part of the state.

Greener Pastures, Dr. Louis B. Martin

Dr. Louis B. Martin, Director of Denver Botanic Gardens for the past three years, relinquished that post as of September 1, 1969, to accept the directorship of Brooklyn Botanic Gardens, New York.

He came to Denver from the Los Angeles County Department of Arboreta and Botanic Gardens, where he had been Chief of the Education Division for five years. His background of experience has been developed entirely in the field of botany. He received his Ph.D. degree in botanical science at the University of California at Los Angeles. He is now chairman of the education committee and a director in the American Horticultural Society, and is vice president of the American Association of Botanic Gardens and Arboreta.

While at Denver Botanic Gardens, Dr. Martin taught short, basic botany courses to volunteer guides, coordinated educational projects which included a summer high school botany class conducted by Denver Public

Schools, and a short taxonomy course for Metropolitan State College students. He addressed numerous local groups on a variety of topics, often giving a "green thumbnail account" of Denver's "handsome botanical showplace"—Boettcher Memorial Conservatory.

As director, Dr. Martin collaborated on plans for future development of the York Street site, the education building, and accompanying fund-raising activities.

Topics that he considered of prime importance to the world of plants were air pollution, plant testing, and training of young men and women in the practical skills of horticulture to meet the growing number of new jobs in the labor market.

Dr. Martin and his family expressed enthusiasm about living in Colorado and were admirers of all the state's natural beauty. He remarked, "The sky for instance — that glorious blue — and those clouds. I've never seen a sky like this anywhere else."

Dry Land Gardening On the Plains

DR. A. C. HILDRETH

THE LAST great region of our 48 contiguous states to be settled by the white man was the semi-arid Plains. The eastern boundary wavers between the 98th and the 100th meridians. Westward, the area extends to the Rocky Mountain foothills; northward, it reaches the Canadian border, and southward, the Pecos River and the south edge of the Edwards Plateau.

For decades, land-hungry people hurried across this barren expanse to settle in Oregon, California and Utah. Settlement of the Plains by farmers occurred mainly during the last twenty years of the 19th century and the first quarter of the present century.

Plains settlers came mostly from humid eastern and midwestern states. It took years of frustration and repeated crop failures to convince these determined pioneers that semi-arid farming is fundamentally different from humid-climate farming.

From trials and errors of these farmers and the researches of Land-grant Colleges, state Agricultural Experiment Stations and the U. S. Department of

Agriculture, there gradually evolved a whole new system of farming. It is peculiarly adapted to Plains conditions and involves special kinds of crop plants, unusual cultural practices and tillage machinery of uncommon design.

The name "dry farming" has been applied to this and all other farming systems carried on under strictly semi-arid conditions.* This name distinguishes these systems from irrigation farming and also from humid-climate farming such as that of our eastern and midwestern states.

While Plains dry farming was evolving, Plains dry-land gardening also was being developed, based largely on dry farming principles. In pioneer days, the utilitarian rather than the aesthetic side of horticulture was emphasized—fruits and vegetables for the table and trees for shade.

Early in this century the U. S. Department of Agriculture recognized the importance of gardening to dry farm families. Research on all phases of dry-land horticulture was sponsored at federal stations located in the northern,

* In the Old World, dry farming was practiced in ancient and even prehistoric times. American Indians dry farmed in Pre-Columbian times. Plains settlers did not benefit from such early experience, nor were they aided appreciably by more recent dry farming experience in other semi-arid parts of the United States. The Plains dry farming system is an independent development of our Plains region. It was begun and brought to its present degree of perfection within less than a century.

central and southern Plains. Projects involved trees and shrubs for windbreaks, fruits, vegetables and many kinds of ornamental plants.

Dry-land horticultural research was conducted also by state Agricultural Experiment Stations. Some of their work antedates that of the federal government by many years.

Results of all these research efforts have been presented in various state and federal publications. They constitute a valuable segment of American horticultural literature.

Ironically, there are now fewer farm families interested in Plains dry-land gardening than there were forty years ago. One reason is, there are now fewer dry-land farmers. Small land holdings have been combined into larger, more economic units, resulting in larger farms but fewer farmers.

Also, with complete mechanization of dry farming, many Plains dry farmers now live in towns and "commute" to their farms. Furthermore, most of those who live on the land have installed water systems large enough to irrigate garden areas around their homes.

Recently, suburbanites of Plains cities have shown unexpected interest in dry-land gardening. Many are finding that, for one reason or another, they cannot irrigate all their acreage. Still they would like to make their unirrigated areas attractive. Hopefully, they are considering dry-land gardening as the solution of their problems.

Such individual problems foreshadow a similar general problem that will undoubtedly plague Plains cities in the future. As these cities expand they inevitably will be short of water. This means restrictions and priorities on water use. Gardeners are always first to feel the pinch of water restrictions.

Although most Plains cities still have untapped water sources, their development will be very expensive and the cost of water will be correspondingly high. With probabilities of restrictions on water use and high cost of irrigation water it is safe to predict that in the not-too-distant future much more of the gardening on the Plains will be dry-land gardening.

Dry-land gardening is not difficult, but it is not merely neglect as some people believe. In fact, dry-land practices require accuracy of timing and quality of performance comparable to those of irrigation gardening.

The all-important dry farming practice is alternate fallowing and cropping. Each year half the land is fallow and half is cropped. Fallowing stores moisture in the soil, giving the next crop the benefit of two year's moisture. Fallow land must be tilled often enough to destroy all weeds while they are very small, otherwise they will rob the soil of moisture, defeating the purpose of fallowing.

This alternate crop and fallow procedure was developed for annual dry-farm crops such as wheat, cotton and sorghums. Unfortunately, use of this practice in Plains dry-land horticulture is limited chiefly to annual flowers and vegetables, for which plantings it is very satisfactory.

Of course, dry land in permanent horticultural plantings, for example, windbreaks, screens, hedges, orchards, shrub borders and perennial borders cannot be fallowed. Before such plantings are made, however, a year or two of fallowing is advisable to insure plenty of moisture for starting the plants. This fallow period is also the time to eliminate by chemicals such perennial weeds as Canada thistle and bindweed.



Dry land windbreak. Young trees in foreground, older trees in background.

Maintaining permanent dry-land plantings is largely a matter of controlling weeds that compete with the garden plants for moisture. On the Plains there is generally enough precipitation to grow either weeds or garden plants, but not both.

Weeds usually are controlled by cultivation. This operation is essentially the same as the fallowing done by dry farmers. The dry-land gardener, however, cultivates the same piece of land year after year and he must do this tillage work among permanent horticultural plants rather than in open fields.

Weed control in permanent horticultural plantings must continue until the garden plants are large enough to shade out the weeds. On the Colorado Plains this often means cultivation throughout the life of the planting.

After several years, however, trees and shrubs, particularly evergreen conifers, may develop sufficient height and density to shade out weeds, at which time cultivation should stop. Thickets formed by suckering trees and shrubs may maintain themselves without weed control but their growth will be slow.

In their zeal to control weeds, early Plains dry farmers and agricultural experts gave little thought to the long-term effect of their fallowing practice on the soil. To them, good dry farming meant fallow land, smooth as a billiard table, without a straw protruding above ground and a 2- or 3-inch layer of fine soil on the surface. Crop residues such as straw and stubble often were burned to make tillage easier.

The "Dust Bowl" era of the 1930's changed popular opinion as to what was desirable in fallowing. Dry farmers finally realized that the dusty surface

resulting from their faulty tillage implements was harmful, despite the "dust mulch" theory of soil moisture conservation which was in vogue the early part of the century but which later was proved invalid.

Farm implement manufacturers cooperated with state and federal agricultural specialists in developing better fallowing machinery. End results of their work are modern tillage implements that leave the surface of the soil rough and cloddy rather than smooth and pulverized. They also kill weeds without completely burying crop residues.

The rough, littered surface condition produced by such implements is called "trashy fallow." It reduces soil erosion, prevents soil crusting, increases water penetration into the soil and decreases moisture evaporation from the soil surface.

Of course, modern dry farm fallowing equipment is too large for cultivating dry land gardens, except for maintaining the important cultivated strip around the outside of the plantings. Garden-size tractors now are available to which can be attached small chisels and sweeps to make satisfactory dry-land cultivators.

Small rotary-type tillers used extensively in preparing garden areas for planting are not suitable for continual cultivation as they tend to pulverize the soil. Hand cultivation is satisfactory for small dry-land plantings.

The trashy soil surface so important to dry farmers is also important to dry-land gardeners. Unfortunately, horticultural plantings, particularly young trees and shrubs, return little organic material to the soil.

To obtain the desired trashy surface some kind of fibrous organic material must be brought in from time to time and spread lightly over the ground —

wood or bark chips, wood shavings, straw, grass clippings or partly composted leaves.

Mulching often has been proposed as a substitute for cultivation in controlling weeds in dry-land plantings. Certainly any means of reducing the work of cultivation would be welcomed by dry-land gardeners. Unfortunately, experiments on the Plains have shown that mulches of straw, hay or sorghum stalks, deep enough to prevent growth of weeds, will seriously damage or kill woody plants under dry-land conditions.

There is now hope of solving the weed control problem in dry-land garden plantings by chemical means. In recent years extensive experimental work has been done on pre-emergence herbicides for preventing weeds in orchards, vineyards, nurseries and ornamental plantings.

Although the ideal material has not yet been found, Treflan, already on the market, has shown promise. Another pre-emergence material, POK, still under test, seems especially suited to weed control in ornamental tree and shrub plantings. Its release is expected soon. Many others doubtless will be developed in the next few years.

Do's and Don't's

1. Avoid shallow soils underlain with rock layers or gravel. Roots of dry-land plants need a large volume of soil from which to extract moisture.
2. Space dry-land plants wider apart than in irrigated plantings.
3. Fertilize dry-land plants sparingly, but incorporate organic matter generously into the soil.
4. Do not cut off lower branches of trees or shrubs to simplify cultivation. Such pruning admits light and wind, encouraging weed growth and increasing moisture evaporation from the soil surface.



FOCUS

on

Bixa orellana

in the
Boettcher Memorial Conservatory

PEG HAYWARD

TROPICAL AMERICA'S achiota or anatto, *Bixa orellana*, is a small evergreen tree which rarely exceeds twenty feet in height. The generic name anatto (*Bixa*) is derived from Bicha, a tribe of South American Indians. The specific name commemorates Francisco Orellana, discoverer of the Amazon. The *Bixa* is commonly referred to as lipstick tree. The family *Bixaceae* consists of one genus with four species. The trees and shrubs are characterized by reddish sap, undivided, alternate leaves, bisexual flowers with five or, rarely, four petals, and seeds with bright red fleshy outer coats.

The anatto tree has smooth, light brown bark, the inner bark being pinkish toward the outside and orange within. The leaves are long-stemmed, thin, ovate or heart-shaped, up to 7 inches long and prominently veined. When in flower it is a showy plant. The flower-trusses grow on upright shoots. Pink flowers 2 inches wide resemble wild roses. Each dainty flower has five broad, rounded petals about 1 inch long surrounding a central mass of lavender stamens. In the spring the tree is hung with bunches of large prickly, henna colored, 2-valved, nearly egg-shaped pods. When the 1½- to 2-inch pods

harden and darken, they split into 2 parts to reveal rows of angular seeds covered with a red powdery material, which provides the anatto dye for commercial use. The coloring principle is known as bixin. The dye is extracted by boiling the seeds in cooking fat or oil, evaporating the mass, and forming it into cubes or rolls for commercial use. The dye is a nearly tasteless coloring matter which has long been used in Europe and America to color cheese, margarine, butter, rice, and candy. Besides certain foodstuffs, the dye is used for cosmetics, soaps, varnishes, and formerly for wool and silk.

The Indians of South America, who considered the anatto tree sacred, cultivated it for many centuries, as remains in ancient Peruvian graves attest. They were the first to use its seeds as a dye, smearing their entire bodies with it, partly for ornament and partly as an

insect repellent. In parts of South America, as well as in Asia where the tree has been introduced, the leaves and roots are used as a digestive tonic and the tough, stringy bark is made into twine. The pulp is used as a remedy for contagious diseases and is applied to burns to prevent the formation of scars. The stems provide eraser gum and in the Philippines the seeds are ground and used as a condiment. To add to the amazing variety of uses made of this tropical American native plant, in Brazil bulls are fed the seeds and pulp to make them more dangerous in the ring.

Bixa orellana is an attractive ornamental and is now being planted in many parts of the tropics where the flowers are favorites of honey bees and the attractive prickly seed pods are used as dried floral material.

Children's Garden Graduates

124 Young Gardeners

GRADUATION exercises, marking the end of the tenth Children's Garden summer program at Denver Botanic Gardens, were held Saturday, September 6, at 2 p.m., in the parking lot area, 1005 York Street. Diplomas were awarded to 124 young gardeners, ranging in age from nine through 14 years.

John C. Mitchell, president of the Board of Trustees and Mrs. James Layden, chairman of the Children's Garden Committee, presented the diplomas and Mrs. John Vittetoe, garden instructor, presented awards and trophies. Dr. A. C. Hildreth, Director

Emeritus of Denver Botanic Gardens, who initiated the Children's Garden project here in 1960, was guest speaker.

An exhibition and fair displaying produce from the children's plots were held in conjunction with the graduation event. First, second, and third place ribbons and honorable mention were awarded for beginner and advanced classes.

The individual plots were also judged by accredited garden judges on layout, number of varieties of vegetables and flowers, general upkeep, harvesting and appearance. In the beginner class Scott Buchanan won first place, Gordon



Pat Hickey, 10, receives special award at Children's Garden Summer program graduation from Mrs. John Vittetoe, garden instructor.

Davis, Jr., placed second, and Terry Ruby placed third. In the advanced class Renee Choury won first place, Scott Nelson was second, and David Vittetoe placed third.

Special awards were made to youngsters who had attended all lectures and special classes throughout the summer.

The summer program was started in April with indoor garden instruction where children were introduced to the various methods of plant propagation, cultivation, and use of tools. They planned the layout of the 10-foot-square plots and prepared the soil be-

fore planting began in May. The wide choice of plants adaptable to Denver climate and length of growing season, included beans, beets, carrots, kale, okra, lettuce, radishes, tomatoes, parsley and many other familiar vegetables. Marigolds, zinnias, bachelor buttons, sunflowers, and California poppies were used for color.

The young gardnerers continued to tend their plots and harvest the produce after school hours until the cleanup session held about the middle of October.

The Colorado Garden and Home Show

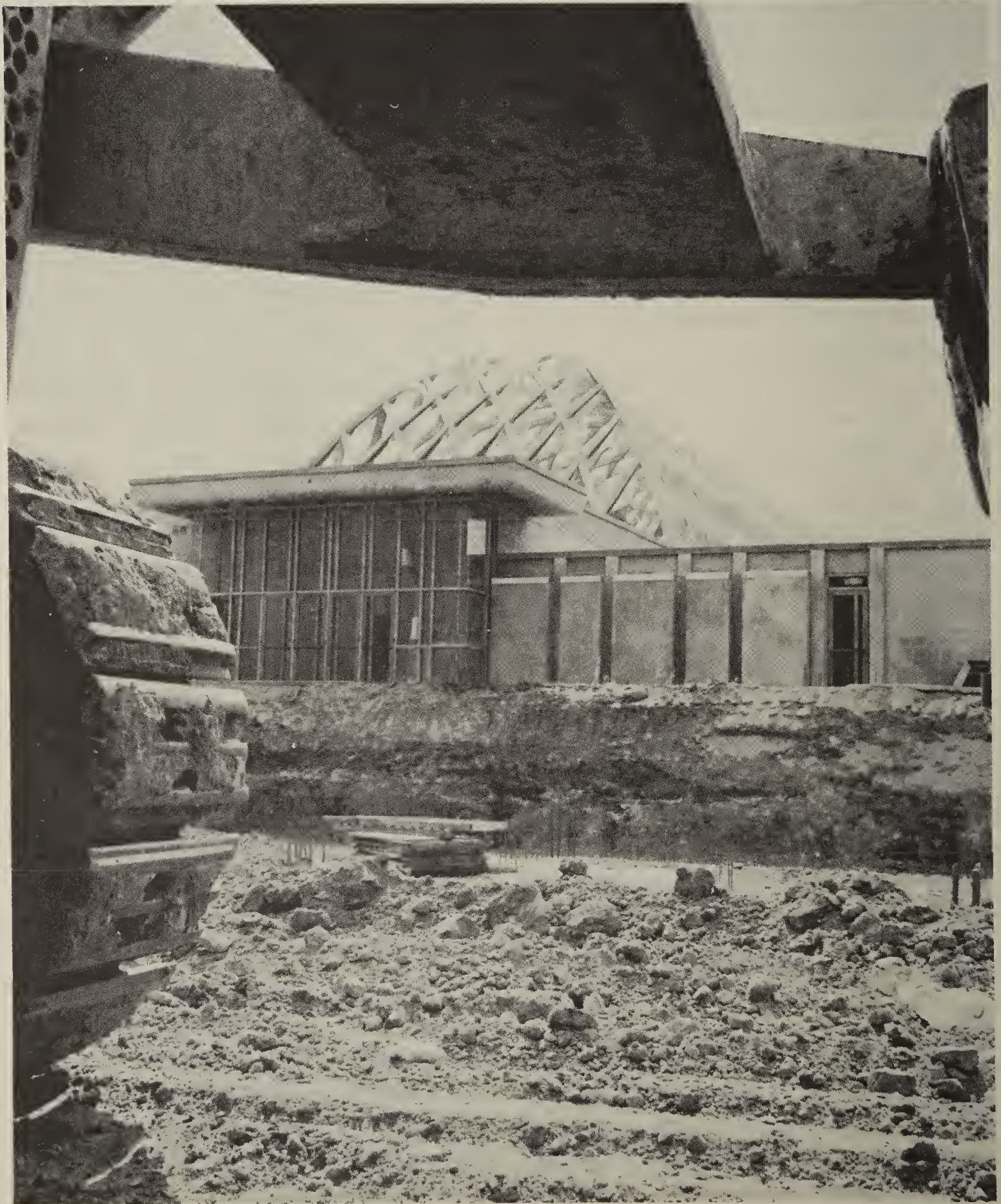
The Colorado Garden and Home Show will have a new home in 1970, according to Dick Haughton, President of Industrial Expositions, Inc., producers of the Show. The Show, previously presented at the Denver Coliseum, will be seen at Denver's new Currigan Exhibition Hall, February 6-15, 1970. Haughton also announced another first for the Show. It will be sponsored by the Home Builders Association of Metropolitan Denver (HBA) joining the Denver Botanic Gardens as co-sponsors of the show.

Chris Moritz, President of the Colorado Garden and Home Show, said plans are under way to take full advantage of the new building's outstanding points in planning the feature gardens to be displayed in the 1970 Show.

Making a return visit to the 11th annual edition of the Show will be Dancing Waters, one of the most popular features of the exposition, which each year presents the region's largest display of new products and services for home and garden.

The Education Building

BERNICE E. PETERSEN



EXCAVATION east of the Boettcher Memorial Conservatory was begun July 15 for construction of the education building, the final phase of the master building plan at Denver Botanic Gardens.

Although subordinate in design to the award-winning architecture of the Conservatory, the new building complements, aesthetically as well as functionally, the fundamental elements of a botanical institution; for here will be housed the Helen K. Fowler Library, Kathryn M. Kalmbach Herbarium, and the mycology collection. Further space will be provided for an auditorium, exhibit hall, classroom and lecture rooms, darkroom and laboratories. Made possible by a recent grant from the Boettcher Foundation and contributions by other generous and interested citizens who gave earlier, the building is essentially in accordance with plans by Hornbein and White, Architects, approved in 1963. The education building is scheduled for completion in October 1970 and will share with the Conservatory the use of a common lobby and public facilities.

The slope of the ground permits making the north part of the building three stories high and yet subordinate to the Conservatory and the two-story south portion. Roof design of the concrete structure is similar to that of the Conservatory; however, only four plexiglass, light-admitting units will be placed at the apex of the building with the rest of the diamond-like areas designed in concrete. Distance from ground level to the dome is 30 feet with the length of the building extending 153 feet along York Street. Red Colorado sandstone trim will give continuity with existing buildings. Sash and doors are detailed in oak, as are all cabinets, bookstacks and other interior trim. Ramps will be provided to make

all parts except the mezzanine accessible to the handicapped. Construction cost, without furnishings, is \$750,000. Gerald H. Phipps, Inc., is general contractor.

The structure is composed of three sections, each with related functions. Planned as a combination lecture hall and exhibition room for major plant shows, the auditorium (64 feet square) will accommodate 450 people either in the conventional auditorium seating arrangement or in-the-round. A platform is provided at the south end of the room with a projection booth located on the mezzanine. Beneath the glazed dome is a 10-foot-square platform, hydraulically operated. It is designed to lift plants and equipment from the basement to main floor level or to double as a central stage extending 3½ feet above the floor. More than 50 display tables for horticultural exhibits can be arranged in the hall and about 430 people can be served at dining functions. A refrigeration room, storage facilities and exhibit preparation room, including buffet kitchen, are adjacent to the auditorium. Provisions have been made for installation of sound equipment.

The Helen Fowler Library will adjoin the auditorium and contain stacks, reading room, rare book room and workroom. Revised plans provide for an office for the librarian. With the enlarged library, books and materials that have been in storage and unused will be accessible to the public and university students. About 10,500 volumes pertaining to horticulture, botany, landscaping, taxonomy and related subjects can be shelved here. A lower level will permit expansion of this facility to include another 37,500 volumes. The only furnishings included in the plans are shelves around the perimeter of the room.

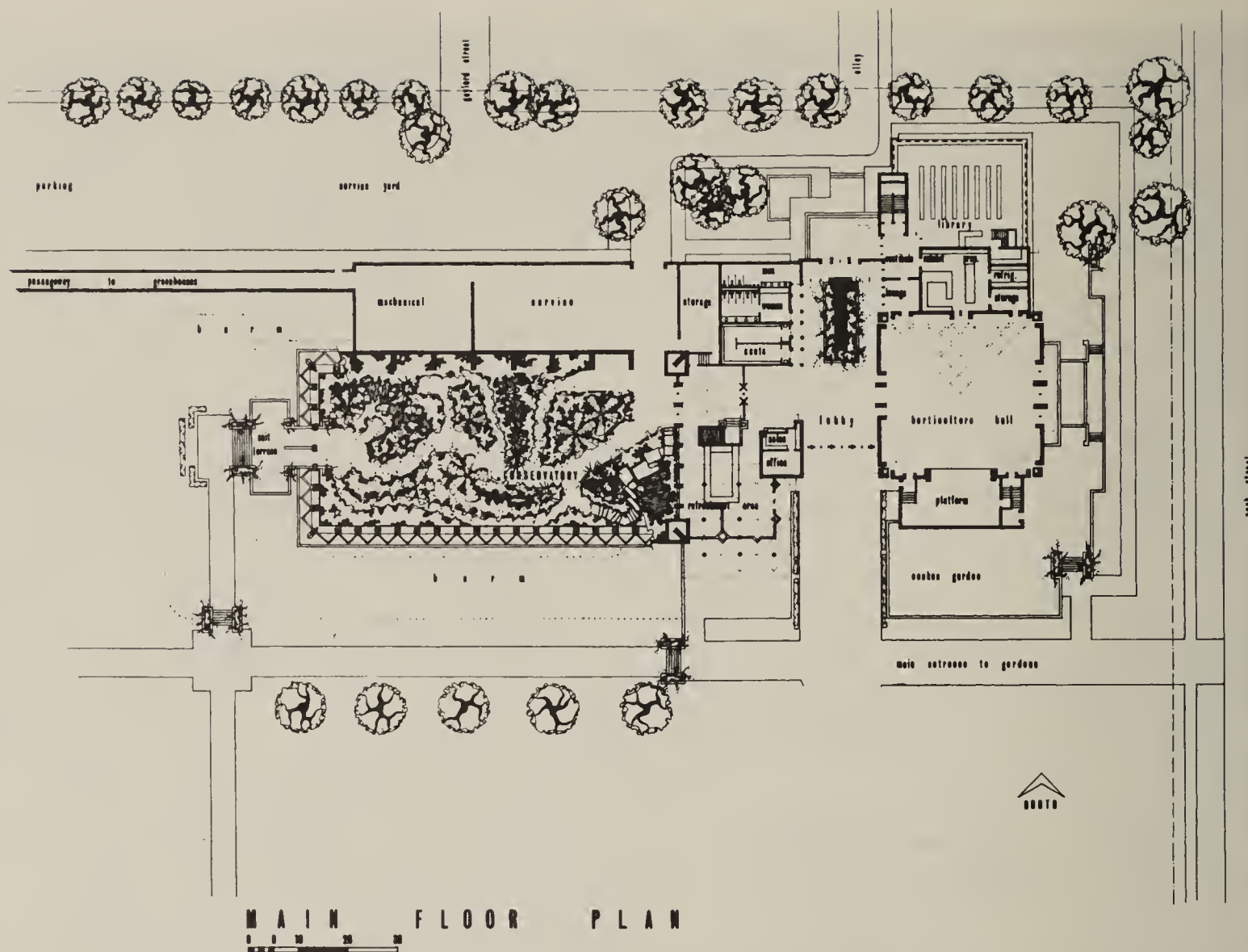


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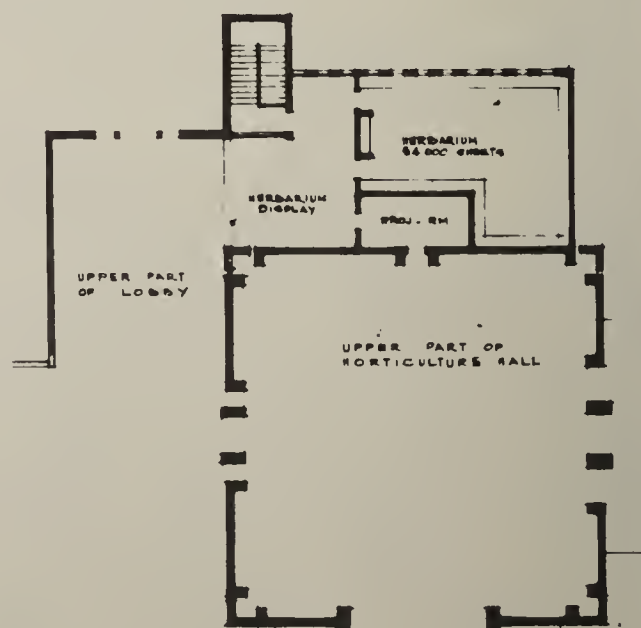


As the building grows, doubtless the enthusiasm for equipping this new structure will also grow. The library is already a beneficiary of such enthusiasm. Before Dr. Martin's departure, a gift of \$5,000 designated "for furnishings and/or books for the new library" was made by Associates of Denver Botanic Gardens, a service organization whose volunteer activities include managing the Gift Shop and carrying out the tour guide program.

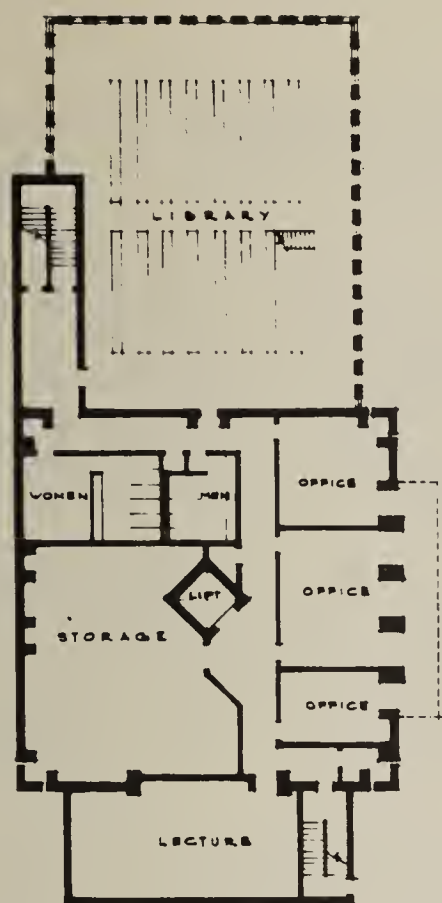
The Kathryn Kalmbach Herbarium, to be located on the mezzanine, will be a depository for approximately 5,000 dried, mounted plant specimens and will allow space for the collection to expand to 50,000 specimens. An herbarium exhibit lounge will open onto the balcony overlooking the lobby.

Besides the future library addition, lower level plans provide for a main lecture room that will accommodate 50 to 60 people with portable dividing

wall, storage and smaller classrooms. A dark room has been incorporated in revised plans with laboratories for research and study of plant pathology. A large laboratory will occupy the area beneath the main auditorium platform and house the mycology collection, which at present shares limited



Second floor plan and scale



Garden level plan

quarters in Botanic Gardens House with the herbarium. This collection of more than 2,000 dried specimens of fleshy fungi from the Rocky Mountain region is the only herbarium of Rocky Mountain fungi except for the one at the University of Montana at Missoula.

The education building, as an integral unit in the Denver Botanic Gardens complex, will soon assume its responsibilities in "accomplishing the purposes jointly shared with the Conservatory to provide botanical education and enjoyment to the citizens of Denver and Colorado."



Exterior of Horticulture Hall

PLANTING COMPOSITION

EDMUND WALLACE, *Landscape Architect**

THE subject of planting composition is quite as indeterminate as the general subject of art. To arrange the masses and create the combinations that carry the qualities of form, color, texture and habit needed to transfer the plan into living scenery—that is the function of planting composition.

Probably the character of the ground, as much as any other one factor, should influence the character of the plant growth. The greater mass of the plant forms will repeat the character of the landscape. The rounded forms of the dogwood, bush honeysuckles and viburnums; and the horizontal effect of the cotoneaster, prairie rose and pfitzer juniper, together with a few upright groups to relieve the monotony of the skyline,

would best exemplify the horizontal lines, characteristic of the plains.

More variety is expected here in the Rocky Mountain region wherever rock outcrop and jagged skyline is visible. The accent type of growth becomes a much larger part of the planting mass. The irregularity of the sumacs and the vertical forms of the Bolleana poplar and silver cedar will be preferred to the dense rounded kind.

Full advantage should be taken of this view of the mountains and rugged country with which so many here in the mountain region are blessed. However small that glimpse may be, framed by foliage, it can be the feature of the garden. Regardless of the plan, the carrying out of the elevation,



whether it be an avenue of stately poplars or points of interest along a garden path, one's eye can be directed to our mountain vista from any point in the garden. The tracery of willows or a white birch group against the purpling hills or the color of a western sunset, the majestic spruce or the informal branching pine serve well as framing.

True, the open country of the west and the ruggedness of our mountains call for a planting outline in keeping with such grandeur—and yet, what a pleasing contrast is provided by a little formal garden on the axis of our view to the valley and the mountains beyond. A pool, placed at a lower level, reflects the loveliness. When such a garden is seen from a higher terrace, the plan design shows to advantage. Low hedges are effective in outlining such a design. Almost any flower bed or border in a garden design benefits by such a definite edging. Where a less formal hedge is used, it can be colorful as well as trim if care is exercised in trimming at the proper time. The flower buds of the spring-blooming plants are formed during the latter part of the growing season, or the food storage period. Such a hedge



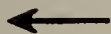
This entrance arch and spruce were carefully located to frame the view to the mountains.

should be sheared after flowering until about the middle of July. Flowering shrubs, such as the Reeves and V.H. spireas, dogwoods, beautybush, Persian lilac and the hybrid mock-oranges, when not pruned after the middle of July, can be depended upon to set sufficient flower buds to present the effect of full bloom the following spring and yet preserve the partial neatness of hedging.

Shrubs that bloom on new wood as the rose-of-sharon, snowberry, and summer spireas should be trimmed to hedge form before growth starts in early spring or at any time after the summer flowering.

Whatever be the character of the ground and surrounding landscape that influences the bulk of the planting, such planting may, as it approaches the house, transfer of necessity into a style befitting the architecture. Here, a similarity in texture and massing, and even in form, is important. Shape of plants to be used may

Left—A pool placed at a lower level, reflects the garden's beauty.





Low hedges bring out the plan design when the garden is seen from a higher level.

be suggested by the massing of the entire building or by the shape of architectural features such as doors and windows.

Coarse-textured construction calls for the use of coarse-textured plants such as the wayfaring tree, late lilac, Manchu cherry and some of the sumacs; smooth surfaces take dense, fine-textured plants like the spireas, euonymous, snowberries and desmodium; and the general design of the architecture may suggest vertical forms or the rounded outline.

Thoughtful plant selection will afford these ties between buildings and planting—but so often the effect originally desired by the landscape architect will be lost through the lack of proper maintenance. Maintenance, however, can be kept to a minimum if plantings are kept simple, trim, and selections made for good branching and compact form.

We have mentioned the mountain vistas which should be a focal point in our Colorado gardens. Unfortunately these are not always present. Colorado's blue skies, however, serve well as a backdrop for iris, daylilies, delphinium and phlox planted on a slope or above a low wall. Here, where the garden lies above the viewpoint, variation in vertical composition is more important than intricacy of plan. The soft pink of the flowering crab and the redbud or the shell-like white petals of the plum against the deep blue of an early spring sky provide an attraction for any garden.

A garden as seen from the terrace or from within, is much more intriguing if not entirely within view. Even on a 60 x 125 foot lot, the planting masses may be so arranged as to provide secluded areas. A site, where the rear of the lot is at a higher level than that of the house, lends itself especially well to this type of treatment.

Such a garden is inviting, and encourages one to go out into it and explore every corner for a hidden pool, a colorful rose garden, or some rare plant.

Likewise, much more pleasure can be derived from outdoor living areas that are not in full view of the house.

Where gardens have become outdoor rooms, actual extensions of the

Planting masses arranged to provide secluded areas make a garden more intriguing.





Colorado's blue skies serve well as a backdrop for planting on a slope or above a low wall.

house itself, we must consider winter effect. The use of low hedges has been mentioned for edging flower beds that are part of a design. Lodense privet retains many of its leaves until the new ones begin to appear in the spring, thus carrying the design of the garden in winter. The colorful bark of the Colorado dogwood and the mountain ash or the fruit of the barberry, red-leaf rose, and the haw, add winter color. Evergreens, of course, lend a touch of green and their branches when covered with new fallen snow provide a pattern of beauty that cannot be overlooked.

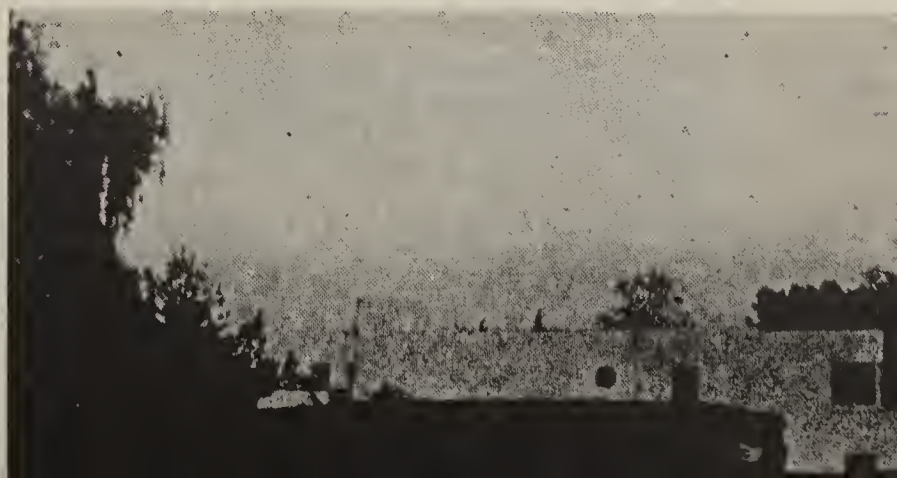
In conclusion, it should be pointed out that the best designed plan does not guarantee a beautiful garden unless it was conceived with the eleva-

tion well in mind. The cozy nooks, the pleasing composition of plant masses, and the attractive color combinations are the studied result of the correct use of proper plant materials.

Again, let us bear in mind that after the general plan, the planting is the art part—the living part of landscape architecture.

See footnote next page

Massing of plants to be used may be suggested by the massing of the entire building.



*Edmund Wallace grew up in Connecticut, and attended Syracuse University, where he majored in Architecture. He later studied Landscape Architecture at New York State College of Forestry. He came to Denver after World War II and worked as a landscape architect for S. R. DeBoer and Co. From there he went to the Denver Parks and Recreation Department, where he became Director of Planning and Engineering. He left Denver to be Chief Landscape Coordinator at Expo '67 in Montreal, and is now Chief of Physical Planning, Canadian Department of Indian Affairs and Northern Development. This position includes being Chief Landscape Architect for Canadian National Parks, as well as having the responsibility of planning communities for the Canadian Indian population and settlements in the Northwest Territories and Arctic Quebec. He is also in charge of aerial photography, interpretation and mapping for the Department as a whole. He and his wife now live in Ottawa.

BOOKS

Available in Gift Shop

Alpines for Trouble Free Gardens.....	Bloom	\$ 5.00
Alpine Wildflowers of Rocky Mountain National Park.....		1.25
Birds of Colorado.....	Bailey & Niedrach	35.00
Birds of North America.....		5.95 and 3.95
Cactus and Succulents and How to Grow Them.....	Haselton	.75
Colorado Birds, Pictorial Checklist of.....	Bailey & Niedrach	10.00
Colorado Wildflowers		1.25
Color Dictionary of Flowers and Plants.....		15.00
Common Edible Mushrooms.....	Christensen	3.75
Decorations with Pods, Cones and Leaves.....	Van Rensselaer	6.95
Driftwood Miniatures	Schaffer	4.95
Easy Guide to Drought Resistant Gardening.....	Nehrling	6.95
Edible Native Plants of Rocky Mountains.....	Harrington	8.95
Field Guide to Rocky Mountain Wildflowers.....	Craighead	4.95
Field Guide to Western Birds.....		4.95
Flowers of Southwest Mountains.....		1.00
Geology and Wildflowers of Grand Mesa.....	Young	3.00
Gwen Frostic Books: A Walk With Me; These Things Are Ours; A Place on Earth; To Those Who See; Wing Borne.....		4.95
Handbook of Rocky Mountain Plants, Nelson (when issued)		
Herbs for Every Garden.....	Foster	4.95
Herbs to Grow Indoors.....	Simmons	5.95
High Country Names.....	Kingery and Arps	4.95
Ikebana Everlastings	Kawasaki	3.95
Living World Series: Life of the Forest; Life of the Mountains; Life of the Pond; Life of the Prairies and Plains; Life of the Rivers and Streams.....		4.95
McCall Garden Book.....	Harshbarger	6.95
Meet the Natives.....	Pesman	4.50
Mountain Flowers in Color.....	Huxley	5.95
Meditations on Garden Themes.....	Robertson	2.00
Native Orchids of Colorado.....	Long	1.25
100 Roadside Wildflowers in Color.....	Dodge	1.50
Plants of Rocky Mountain National Park, Nelson (when issued)		
Rocky Mountain Flora.....	Weber	9.40
Rocky Mountain Flowers (Reprint).....	Clements	7.50
Saikei, Miniature Landscapes.....	Kawamoto	6.95
Sierra Club Paperback Books and Posters		
Sunset Garden Books (Complete Listing).....		1.95 and 2.95
Weathered Wood with Flowers.....	Knight	6.95
Brooklyn Botanic Garden Handbooks.....		1.00 and 1.25
Selection of Children's Books on Nature and Gardening.....		.75 and up
Additional books on general gardening, Japanese Gardening, Flower Arranging, Botany, House Plants, Herbs and Wildflowers.		

CHRISTMAS SALE

CATHY PETERSEN

Don't miss the annual Christmas Sale Friday and Saturday, November 21st and 22nd, 10 a.m. to 4:30 p.m., in the Gift Shop of the Boettcher Memorial Conservatory.

A new collection of exciting gifts and Christmas ornaments will be on hand for this year's Christmas shopper.

In this collection is a series of shimmering crystal-like animals, trees and mushrooms made of plexiglass by Colorado artists.

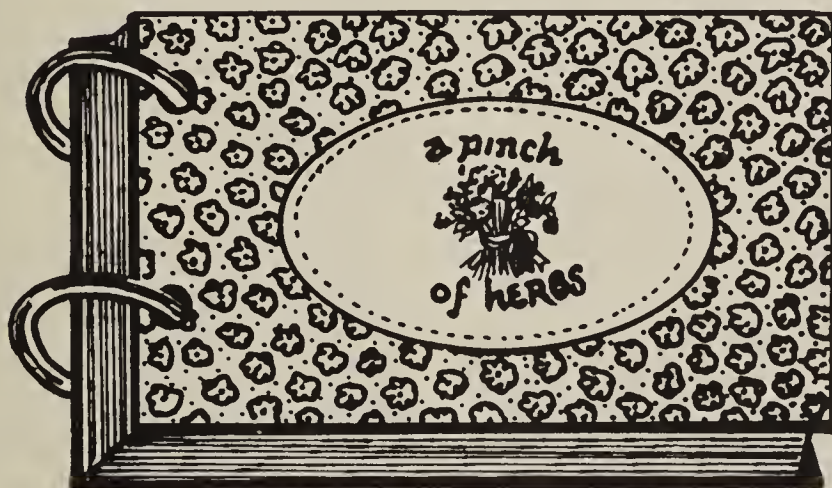
Pansies, dandelions gone to seed and Queen Anne's lace have been captured in the most unusual and sought-after paper weights.

Look for our linen towels with fruit,

vegetable and Christmas designs; pot holders disguised as butterflies, strawberries, and hens; decorative wrought iron, from candle holders to weather vanes; tree ornaments made of natural plant material, wood shavings, and glass; candles of all sizes, shapes and colors; hand crafted stoneware containers and ceramics from England and Italy.

This year the Workshop has outdone itself in a most unusual collection of tree ornaments. In addition, these talented workers have created weathered wood and bark plaques, candle rings of natural plant material and other hand crafted items.

See you at the Sale!



A calico cookbook full of delicious tried and true herb recipes has been compiled by the Tussie Mussie Mesdames for sale at the annual Christmas Gift Sale November 21 and 22 for the benefit of Denver Botanic Gardens.

The book is quaint and happily nostalgic. Enticing and unique are the selections on "Flower Cookery," "Of Course You Like Vegetables!," "The Meat of the Matter," each cleverly illustrated by a young Denver artist, Mrs.

Julie G. Scott, a creative herb cook, too!

The Tussie Mussies is a group of 10 women in this area who became interested in herbs because they indulged in the gentle art of gourmet cooking and loved to garden. They hope to interest more cooks in the use of herbs and sweet-smelling plants.

A Tussie Mussie is a quaint nosegay of flowers and pleasantly aromatic plants. If you want to know more, buy a cookbook!

Care of Gift Plants

DR. HELEN MARSH ZEINER

THIS IS A time of year when many people will receive gift plants. Naturally, the recipient of a beautiful plant wants to keep it at its best for as long as possible. This is not too difficult if you follow a few good common-sense rules which apply to any gift plant.

First, keep the plant in a cool part of the room. If this is not a place where the plant can be displayed to advantage, keep it where it can be seen and enjoyed during the evening or when it is needed to brighten the room, then return it to the more suitable location at night and during the morning hours.

Second, give the plant good light, but do not keep it in direct, hot sun. An east or north window is suitable. If you have little choice but a west or south window, keep the plant back from the window far enough so that the heat coming through the glass does not hit the plant full-force.

Third, keep your gift plant, particularly a flowering plant, moist but not wet. Flowering plants require lots of water, but they should be well-drained and must *never* stand in water. Since

most gift plants come with the pots wrapped in metallic paper, check to be sure that the florist has poked a hole through this paper under the drainage hole in the pot. If there is no hole, make one so that surplus water can drain away. Obviously this necessitates setting the pot on a saucer to protect table tops.

Fourth, spray or gently rinse the leaves of gift plants about once a week. Use cool tap water. To prevent burning of the leaves, do not put the plant in sun until the leaves are dry.

These general rules will help to keep any gift plant attractive for a maximum period of time. When the plant is no longer attractive you may find it best to discard the plant, or, if you have patience and the proper conditions for carrying the plant along, you may keep it with the hope that it will bloom again another year.

Following are some more *detailed* rules for the care of specific gift plants:

Chrysanthemum

A blooming chrysanthemum can be expected to be attractive for about a

month. If the plant has unopened buds you can expect a longer period of bloom than from a plant whose buds have all opened.

Watch your chrysanthemum closely, and water it whenever it becomes dry to the touch. It must never be permitted to wilt. An east window is an ideal location.

For best results, the plant should have day temperatures of 70-72 degrees F. and night temperatures of 50-60 degrees F.

Florists' chrysanthemums are not meant to be permanent house plants. It is generally best to discard these plants after flowering. Some gardeners do try to carry chrysanthemums over to use outdoors in the summer. This is a practice of questionable value, since most of the varieties used for indoor forcing are not adapted for outdoor use in our area. They may bloom so late that they are killed by frost before the buds open, others may bloom early but are seldom winter hardy.

If you want to take a chance on a season of outdoor bloom, cut off all withered flowers and care for the plant as you did while it was blooming. If it loses its leaves, cut it back severely, keep it barely moist, and let it rest until spring. Set it out when all danger of frost is past.

Azalea

The azalea is a very popular gift plant which most people can maintain for several years. It should be kept in as cool a location as possible but it must receive good light. It must be kept moist, but it must not be water-logged. Spray the leaves with water frequently. This compensates for lack of humidity and also discourages red spiders, the one pest which may cause you trouble. If red spiders should attack the plant, wash the leaves well with yellow

naphtha soap and rinse thoroughly. If this does not prove effective, spray the azalea with nicotine sulphate or malathion.

Buds may blast if the air is too hot or too dry or if the soil is too dry. Growing the plant on a gravel-tray is helpful.

During the summer, the pot should be sunk outdoors in a shady location. Be sure that it is kept well-watered. Before there is any danger of frost, prune the azalea to shape, check carefully for the presence of pests and bring into the house to a cool, well-lighted spot.

Feed the azalea about once a month. About once a month or every six weeks, add $\frac{1}{4}$ teaspoon iron sulphate to the pot. Lacking this, use $\frac{1}{2}$ teaspoon household vinegar to a quart of water. Use this solution only when the soil is moist. Both of these treatments help to acidify the soil.

When an azalea needs repotting, use a potting soil with a high percentage of peat and be sure that you provide good drainage in the pot.

Amaryllis

Hybrid amaryllis with their huge blossoms are very popular around Christmastime. To make the blossoms last as long as possible, keep the plant in a cool part of the room and do not put it in direct sunlight. Keep it moist.

After blooming, continue to water the plant and feed it about once a month. Good care is important to build up the bulb so that it will bloom again another year. In the spring, sink the pot in the garden in a semi-shaded spot. Keep moist.

Before danger of frost, return the amaryllis to the house. Store it perfectly dry in a cool part of the basement. Cut off the foliage as it yellows. Let the bulb rest for three months, then

bring it back to the light, water it well and keep it moist, and watch for the blooms to appear. Sometimes a forced bulb will not bloom the first year after forcing. If you continue to build up the bulb, however, it should then bloom the following year.

Poinsettia

This is probably the most popular of all the Christmas gift plants. New and improved varieties have been developed. These plants are more compact and more sturdy than the older varieties. The "flowers" are also very long-lasting. Today's poinsettias come with "flowers" in pink or rose and even white as well as the traditional red. The so-called flowers are actually bracts or modified leaves. What appears to be the center of the "flower" are the actual flowers.

A poinsettia must be kept out of drafts. It needs some sun. Be sure to keep the soil moist. Poinsettias do not like great fluctuations in temperature. They would do well with a temperature of 70 degrees F. during the day and 65 degrees F. at night.

Sooner or later the leaves will drop. Then you must decide whether to discard the plant or try to hold it over for another year. If you want to keep the plant, rest it until spring in a cool, dark basement where it should be kept dry. After danger of frost is past, cut the plant back, repot and sink the pot in a sunny part of the garden. In late summer, prune to shape the plant and reduce its size if necessary. Bring indoors before there is any danger of frost.

Since the poinsettia is a short-day plant, it should be covered with an opaque cover to shut out the light so that it receives no more than 12 hours of light from about the middle of September until buds appear. If you do not want to take this trouble, accept

the poinsettia as an attractive foliage plant and do not be disappointed if it does not bloom a second year.

Christmas Begonia

Christmas begonias (usually "Lady Mac" or a strain of "Lady Mac") need some sun and a moist atmosphere. For long-lasting bloom, grow the plant on a pebbletray. Water the plant moderately, and be sure that it has good drainage.

Most people will find it best to discard the Christmas begonia after it blooms. However, if you wish to keep it, cut the plant back severely. Keep it moist and as soon as danger of frost is past, sink the pot outdoors in a partially shaded location. Bring in early in the fall and repeat the care you gave it while it was in bloom. The parts which you removed can be made into cuttings and rooted in moist soil or vermiculite to provide young plants for the following season.

Christmas Peppers and Jerusalem Cherries

Christmas peppers and Jerusalem cherries are unrelated plants, but both produce red fruits at Christmas time and both require the same care.

Christmas peppers have fruits which are long and narrow and show their relationship to the edible "hot peppers." Jerusalem cherries are round and cherry-like in appearance.

Both of these plants should be kept cool, out of drafts, and should receive lots of light. Hot, dry air will cause the leaves and fruit to drop. The soil must not dry out.

After the fruits fall, discard the plant or cut it back and rest it until late May when it can be set in the garden for the summer. It may bloom and produce fruits late in the summer.

Seeds from fully ripe fruits may be planted in May or June to provide young plants for winter use.

Denver
Botanic Gardens
LECTURE SERIES
1969-1970

1969

OCTOBER 16

CHARLES M. DRAGE, Council Coordinator, Colorado State University: "Hydroponics — Gardens of the Future."

NOVEMBER 13

DR. HELEN M. ZEINER, Botanist: "From the Grassland to the Tundra."

1970

FEBRUARY 19

DR. E. H. BRUNQUIST, Curator of Botany, Denver Museum of Natural History, and a member of the Emeritus Faculty of the University of Colorado School of Medicine; and MRS. LORAIN YEATTS, Photographer: "Wild Plants in General and a Few in Particular."

MARCH 19

DR. WILLIAM A. WEBER, University of Colorado Museum Herbarium Curator: "Geographical Affinities of the Rocky Mountain Flora."

APRIL 16

KENNETH MILLS, Biology Teacher, George Washington High School; Greenhouse Supervisor: "Environment for Learning."

These lectures will be presented in Boettcher Memorial Conservatory, 1005 York Street, at 8:00 p.m. The public is invited at no charge.

Landscaping the

Convention Center

THE NEW Currigan Exhibition Hall stands as a bold architectural statement in downtown Denver. Like any work of art, one must stand back and view the complete picture to fully appreciate what has been done. For this reason, the open spaces and streets adjacent to the Exhibit Hall become an important part of this whole complex. Three areas of note within this open space are: the Entrance Court via 14th street, the 12th street island and the street tree planting.

The original entrance court proposed by the architect incorporated sunken gardens with a large pool-fountain the full length of the garden court. A wide pedestrian bridge stretched over the gardens to take the pedestrian onto the main exhibit floor. One can imagine the pleasant experience of glancing down and being attracted into the cool, pleasant spaces below. This design plan was curtailed, however, when budget problems beset the project and a different approach was used. The setting to any building cannot be dealt with lightly for it can, and does, effect the mood and feelings of those passing through.

As in most large structures, the Exhibit Hall itself determined the shape

of the open space. With the building set back some 150 feet from the street and covering the complete block, a large rectangular area remained for the entrance. Here the necessary space was preserved to create an open setting, observe the structure and develop a large entrance plaza. With large masses of people spilling out from the Exhibit Hall and others entering, the entrance area demanded good pedestrian circulation while at the same time striving for that personal feeling. Thus, the existing 14th street court was designed as a free moving plaza, broken by a grid of 32 honey-locust trees placed in seat-height, exposed aggregate planter boxes. The tree patterns were developed to complement the structure and create a large canopy of shade where the busy conventioneer can pause to relax. Dominating the plaza on the northeast is a seat-height pool-fountain of exposed aggregate to match the planter boxes. On the southeast end of the plaza, open space was left inside the perimeter planters for outdoor exhibits, small gatherings, or informal entertainment. Large "Skyline Honey-locusts" were selected for the dominate shade tree due to their light, airy characteristic which contrasts nicely with

the weathered steel facade without creating a dense canopy, obscuring the view. As these trees mature, they will give a feeling of enclosure around the fountain and plaza areas. To provide the planters with color during the winter season, two different types of ground covers were specified. *Mahonia repens* for a splash of red fall color and *Sedum* Baby Tears for a contrasting light green all season long.

To date, the 12th street island remains undeveloped until funds are available for its completion. The Parks Department felt that the parcel between Speer Blvd. and the Exhibit Hall, had it remained intact, would have fostered a magnificent vista across Cherry Creek and Speer Blvd., but the automobile shall have its day and a circular turn-around was recommended to move all the expected tourists, sightseers and buses. This, in turn, formed the one and one-half acre island on the west side. Present plans call for two pedestrian walkways to meander through the island into the Exhibit Hall Entry. With many out-of-state travelers in the area, we felt that somewhere in the landscape an area devoted explicitly to native material would be most appropriate. On the Speer Blvd. side of the building an outdoor balcony projects out from the exhibit floor. As the tired conventioner views the island from this level he will be invited to stroll through native plantings of Colorado Blue Spruce, Ponderosa Pine, Douglas Fir, or admire groups of *Mahonia repens*, chokecherry, Sumac or potentilla, all planted on subtle earth mounds with sitting areas nearby.

The purpose of using street trees along both Champa and Stout Streets is to ease the transition from bold steel facade and high exposed aggregate walls to the street level. Here we need

trees of a size which will grow tall enough or broad enough to dominate the street and not obscure the building. Trees of such size need more adequate root space and ground area than any parking strip can ever supply. In this case, parking space was at such a high priority that a proposed eight-foot landscaped strip along Champa and Stout Streets was ruled out. Yet trees placed in the downtown environment are living under the most adverse conditions with their roots restricted by large areas of paving, subjected to intense sun-glare, and to breathing polluted air. After checking with numerous wholesale nurseries, both in and out of state, the decision was made to use Lanceleaf Cottonwood, *Populus angustifolia*, from the Denver City Nursery. While not known for its merits as an outstanding street tree, it was in plentiful supply, of large caliper, and offered a fast growth habit. The trees were placed at sidewalk level in 5' by 5' spaces blocked out of the concrete, on approximately 45-foot centers. Each tree is served by the project's automatic sprinkler system. Dark brick pavers, to match the steel facade, cover the space around the trees. Trees growing under these conditions can expect to be short lived, and a replacement period of between 5 and 10 years seems very probable. The street tree planting points out that more and more the automobile becomes the foe of the landscape as its asphalt requirements destroy or make impossible green space around the building. Thus, the search continues for the neat, narrow, non-trouble tree which will conform to all the necessary requirements. Some day we will begin to think in terms of adjusting the city to the desirable tree, rather than adjusting the tree to some mechanical street plan.

R. S.

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A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden center around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

WINTER 1970



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THE GREEN THUMB

VOL. TWENTY-SEVEN, NUMBER ONE

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DAVID A. BLADES, *Editor*

WINTER 1970

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The Markley Garden

KATHARINE B. CRISP



DURING RECENT years on garden tours sponsored by the Denver Botanic Gardens many beautiful gardens in and around Denver have been opened to the public. On the August 1968 tour one of the gardens visited was at the home of Dr. and Mrs. Miles Markley. This garden was especially

interesting because of the many garden styles that have been incorporated in one garden which create many surprises.

Fine specimens of trees grow in well chosen spots. On the parking area to the north there is a Norway maple, to the south a black walnut, a graceful

shade tree growing here since 1945. The Norway maple was planted in 1950. It has a trunk 13 inches in diameter; the black walnut, 15 inches. These

trees are planted far enough apart to allow for continued future growth.

Near the front entrance of the house stands a pin oak planted in 1940. Sev-



eral attempts were made to establish an oak tree here. Finally, the problem was solved by bringing scrub oak leaf mold, rich in animal and vegetable matter, from the mountains and placing it in the tree hole. The trunk of this tall, stately tree is now about 13 inches in diameter. The leaves turn a shiny brown in the fall. Beautiful shadows are cast by the branches on the lawn and against the house. To the south, a honey locust tree was planted in 1937 and is larger than the oak. Nearby, a red silver-leaf crab apple provides seasonal color.

A carefully pruned Hopa crab apple spreads its branches like a bouquet. This tree had been rejected by friends to whom it was offered as a gift. Its winter aspect is especially pleasing. A Bechtel flowering crab apple completes the scene. How exciting it must be to watch the succession of swelling buds in the spring!

The path leads to a gate that opens into the rear garden. One soon realizes that this garden is an extension of the house in a genuine indoor-outdoor relationship which has been created by experimenting with several styles of planting.

The patio faces east and is furnished for comfortable outdoor living. An outdoor fireplace adds two months to the use of the garden. A large Dolga crab apple shelters the patio from the east, produces fragrant and showy flowers in the spring and rosy-red apples in the fall, delicious for apple butter.

A wisteria vine with thick twisted stems grows over the roof of the patio furnishing a shower of lavender-pink color when in bloom.

Around the patio roof Japanese bells are suspended, carefully chosen to play harmonious tunes as the gentle breezes blow.

In other parts of the garden are

various vines such as Boston ivy clinging closely to the wall.

Growing trees and vines on trellises, or espaliers, is a common European practice whereby all available space can be used. This requires patience and skill in pruning and is demonstrated most successfully in the Markley garden.

On the north wall of the house, near the gate, a Halehaven peach has been trained on a trellis. A second one has been pruned to grow on the east wall of the house. The peaches on this tree are especially large and of beautiful color. From exposure to the sun on the east wall and from constant trimming of the tree, the peaches, though fewer in number, are larger, more beautiful and delicious.

A third peach espalier forms the back or north wall of the garden shelter. The seat in the shelter house faces the major area of the garden. This peach tree in favorable years bears a bushel or more of peaches.

Pyracantha shrubs have been espaliered on the east wall of the garage, producing a fine display of flowers and berries. On the north wall of the garage is an espaliered Delcon apple.

The garden bench is placed for comfort where one may rest and contemplate, particularly the rose garden with its 150-200 rose bushes.

Back of the bench is the corn patch, an area shared with the neighbor. There are two plantings each season. The fence separating this area from the main garden carries carefully trained grape vines, one blue Concord and two varieties of white Concord.

Against the north garage wall a large redwood compost box has been built that blends in with the garage. All leaves and grass clippings are placed

here, separated by frequent layers of soil to control the odor of decay. This compost soil is used in flower borders and beds. Twenty to thirty wheelbarrow loads of compost are produced each season.

In 1938-1941, a rock garden was constructed. The rocks were hauled from the Rocky Mountains in the utility trailer. A reinforced concrete pool was built. For the water course the

neighboring white wall. To shape the tree, weights are hung on the larger branches until the direction of growth is established. The leaves of a small clump of aspen tremble in the breeze and the bamboo winters nicely here.

At the south side of the garden a Russian olive grows. Its bent trunk and curved branches produce an interesting Japanese effect.

A very productive vegetable garden



rocks were placed firmly in a position to direct the water into the hill.

Dwarf evergreens and low plants are growing here, guarded by a stone lantern bought in Kobe, Japan. This Japanese garden occupies the southeast corner of the rear garden. A large eastern white pine shelters the area from the south. Its gracefully bent branches are silhouetted against a

grows at the south side of the house. Here, plebeian vegetables and aristocratic flowers grow side by side. A grape vine espaliered on the south wall of the house forms the backdrop for the vegetable garden. In a limited space, tomatoes, lettuce, radishes, chard, carrots, turnips and beets are grown.

Across the path to the south, runner

beans are trained on cords to form a 5-foot-high tepee. Which bean plant reaches the top first? The tepee supplies frozen beans and the corn patch frozen corn.

In the rear garden stand two exceptionally blue spruces. A Mugho pine, sheared to globe form, is about 12 feet in diameter. These, together with the eastern white pine, are all very striking and well groomed. Each retains its characteristics yet forms one harmonious whole in the design of the garden.

The blue spruce was first planted in 1915 at 2390 Forest Street and moved to its present location in 1937.

There are tall junipers in various locations. The Mugho pine is trimmed two times, usually as growth starts, and the junipers twice yearly by the owner. The evergreens get two professional sprays yearly.

New plants are being tried out each year and the garden continues to grow.

In 1969, a flowering plum was planted on the northeast corner of the garden and a dwarf cherry tree on the north side of the garage.

In the flower borders and beds there is a succession of bloom from early bulb plants to the fall "mums." Geraniums in ceramic pots adorn the east wall of the house and also grow in the flower beds. These geraniums, from cuttings, are grown in the basement flower room.

The Markley garden is illuminated at night by gas light lamps, 100 years old, bought in Edinburgh, Scotland, and placed on the original 350-pound cast iron posts. These gas lamps were changed to electricity. Time clocks were added in 1900 to turn off the lights. The clocks are wound each weekend.

The walks are red sandstone; the flagstones were transported from the



quarry in Lyons, Colorado, in the utility trailer.

The lawn is bent grass, planted as a deterrent to dandelions; the owner prefers blue grass, however.

A time clock sprinkling system with copper pipes has been installed. A white cedar stockade fence forms the back wall of the garden.

This garden, now 30 years old and covering five lots, has been planned and cared for by the owners. The wide variety of trees, shrubs and flowering plants is strong evidence of the owners' love of gardening and keen interest in nature.

Walking through the garden, one realizes that a garden is "a place to turn the soil, fence in the paths, plant out flowers and shrubs that delight the eye, and then at evening rest from the labor, drink in the perfumes and breathe the peace that comes with dusk."

HYDROPONICS

CHARLES M. DRAGE

YEARS OF research by numerous scientists have proven that many crops can be grown without soil. During the past several decades, many amateur and commercial gardeners and many others with limited plant knowledge or experience have become interested in growing plants with the plant roots in something other than soil. This method of growing plants is commonly known as "hydroponics." Hydroponics is a coined word from the Greek "hydor" (water), and "ponos" (labor). In reality, hydroponics is soilless culture. Synonymous terms are chemical culture, chemi-culture, nutrient culture, nutri-culture, gravel culture, soilless culture, aggregate culture, and tank culture; the word gardening is frequently used instead of culture.

The earliest recorded water culture experiment was reported by Woodward in 1699, when he concluded "That earth, and not water, is the matter that constitutes vegetables." This conclusion was reached after he grew spearmint in several kinds of water: rain, river, and conduit water, to which in one case, he added garden mold. He found that the greatest increase in weight took place in the water containing the greatest admixture of soil.

Modern techniques in water culture started in 1860 by Sachs. During the next 60 years, many workers developed nutrient solutions. D. R. Hoagland developed solutions in 1920 and his formulas have been the ones most often used in the laboratory. It is often reported, or at least supposed, that some

remarkable new combination of salts has been devised, and that the prime requisite to success is to use a particular formula. The fact is, there is no one nutrient solution which is always superior to all other formulations. Plants have marked powers of adaptation to different nutrient solutions. If this were not true, then the same kind of plants would not be growing successfully on the wide variety of soils.

In the decade just prior to the outbreak of World War II, popular interest in soilless culture increased greatly. This interest was aroused because of published results of research in California, Indiana, New Jersey, and Ohio. CSU first published hydroponics results in 1941 with George Beach and George Mussenbrock reporting; a second paper by Mussenbrock followed in 1947. Subsequently, research was discontinued because the work had demonstrated that hydroponics was feasible with intensified, high income greenhouse crops. The work at CSU was largely devoted to carnation culture.

Considerable publicity accompanied the production of fresh vegetables in tanks by the United States Army Air Force during World War II on the Ascension Islands and Iwo Jima. It should be pointed out that the vegetables were very much needed and the soil and water was so contaminated that neither could be used. Distilled sea water was used, and the aggregate was lava cinders.

The Denver Flower Growers Association, a very active professional group,

followed the research at CSU quite intently. Some gravel culture benches were installed in the Denver area but later abandoned. Apparently, hydroponics production was not economic and growers understood soil culture and not chemical culture.

During World War II, a large, well-financed hydroponic production unit was established in Florida, The American Hydroponic Farm, Inc.; it is believed that this unit is still in production. Tomatoes are grown under cover in pots and the aggregate is perlite. However, very little was said about hydroponics until about six years ago; since that time, we have been exposed to considerable promotion that has led to a great deal of misunderstanding. A large number of people became interested; a majority of these people had little experience in growing plants and even less experience with greenhouse culture. In Colorado, we must consider hydroponics a method of greenhouse production.

In 1966, I had correspondence or consultations with 80 individuals or firms interested in commercial hydroponics. In 1967, the number had grown to 120; in 1968, it was down to 36. These people became interested because of promotion. They failed to realize that if the enterprise were as profitable as the way they interpreted the information they received, they probably would never have been offered the "opportunity" of a lifetime. This promotion followed the development of improved molded plastics and automation. It also accompanied numerous reports of world-wide starvation and the necessity for greater food production.

In this connection, Dr. Grace A. Goldsmith, Dean, School of Public Health and Tropical Medicine, Tulane University, speaking at the national nu-

trition conference on the CSU campus on July 7, said, "It is no time to become complacent. We have malnutrition among us right now; although the exact magnitude of it is not known in the United States or elsewhere, it cannot be solved simply by increasing agricultural production." Unmarketable farm surpluses have been a problem for many years in the United States. It appears now that the government will buy production rights and retire land from production for a long time just to prevent overproduction.

A number of people have spent considerable sums of money in hydroponics ventures before they determined whether a profitable market existed for their product. If you are considering commercial hydroponics, you must have satisfactory answers to two questions: 1. Does a profitable market exist for the product? 2. If a market exists, then which is the cheapest way to produce the product to meet competition?

In 1966, following promotion in Texas that extended into other states, Texas A & M College in L-203, *Growing Plants in Water*, said, "Growing plants in chemical solution or hydroponics should usually be attempted only as a hobby. Under existing Texas conditions, this method of plant growing has not proven practical or economical."

We at CSU believe that the most practical greenhouse production method, at least in our situation, is a modified hydroponics. The plants are grown either in benches or on ground level using aggregates such as scoria or "Idealite." The nutrients are injected into the water and when the plants are watered, they are fed. Frequency of watering can be completely automated to correspond with the rate of plant growth influenced by light, tempera-

ture, available carbon dioxide, and other factors. This method provides constant control of the nutrient solution; the same solution is not recirculated and it is not necessary to dump tanks or to test and adjust nutrient solutions daily.

Hydroponics will continue to be a valuable research method to study the nutrient requirements of crops. It will continue to be an interesting hobby for many and it is likely that hydroponics

will continue to be promoted as a commercial venture. For the individual who is interested in hydroponics as a hobby, I suggest studying the University of Illinois Circ. 844, *Hydroponics As A Hobby*. For more information, the California Agricultural Experiment Station Circ. 347, *The Water Culture Method For Growing Plants Without Soil*, is an excellent reference. These are just two of a long list of references which includes several good textbooks on the subject of hydroponics.

The XI International Botanical Congress

MORAS L. SHUBERT
University of Denver

Denver Botanic Gardens members will be happy to know that our efforts in providing hospitality and transportation to the Pre-Congress Field Trip, under the leadership of Dr. William A. Weber, University of Colorado, and Dr. Bettie Willard, Thorne Ecological Foundation, were greatly appreciated. In Seattle, I saw many of the 43 guests at our dinner on the evening of July 31, which was followed by Dr. John Marr's presentation of the "Ecology of the Front Range," and all were most grateful for what we did. Many said that it was the most memorable event of the whole trip, which lasted for 23 days.

There were so many involved that evening and in providing transportation for the Mount Evans field trip the next

day that space does not permit our naming them, but it was heart-warming to see how much cooperation is at hand among our Denver Botanic Gardens members when they are called on for help.

The Congress convened at the University of Washington from August 24 through September 2 for the worldwide gathering, which occurs every five years for botanists, amateurs as well as professional scientists. There were nearly five thousand present. The purpose of the congresses is to provide for international communication and to establish rules of nomenclature which give some assurance that a plant species name will be recognized throughout the world. Because of previous actions of

the International Bureau of Nomenclature, there is greater uniformity in the establishment of latinized names for plants than there had been prior to the formation of the congresses.

Much of the time during the ten-day conclave was devoted to group meetings, symposia, on specialized topics. For example, on Tuesday afternoon, August 26, there were 20 such meetings in session, on topics ranging from economic and drug plants to the most sophisticated research in physiology and genetics. Obviously, we as individuals had to choose the sessions which were of individual interest to us. Fortunately, every paper presented was summarized in an abstract and published in the official Abstracts, which will be found in the Botanic Gardens Library, because the Denver Botanic Gardens was granted a complimentary Institutional membership for its generosity mentioned earlier. This means that we will get several volumes of Proceedings when the material is finally published, but some of the printed material will not be available until next spring.

As an indication of the concern of botanists for the nutrition and health

of mankind, one all-congress symposium was convened in a large pavilion for the consideration of the world food supply. Much concern was shown about our deteriorating environment and food shortages which are expected to become critical within a period of less than 15 years. While the frightening thought of starvation on a widespread scale in so short a time must not be minimized, some of the reports presented at that meeting revealed encouraging possibilities for providing more food and better sources of protein than we now have. All were in agreement, however, that the plant scientists cannot provide significant help if populations continue to increase at the present rates. There was considerable discussion about the necessity of world-wide population control immediately to halt inevitable decimation by starvation and disease from malnutrition.

The XII International Botanical Congress will convene in 1975 in Leningrad, by invitation from the representatives of the U.S.S.R. They promised that extensive field trips will be arranged. If anyone wishes to attend that congress, it is not too soon to start planning.

VOLUNTEERS—*We Need You*

Request for Membership Application

ASSOCIATES OF DENVER BOTANIC GARDENS

909 York Street, Denver, Colorado 80206

DUES: \$1 — REQUIREMENTS: Interest in and desire to aid
programs of Denver Botanic Gardens

Name (Mr. Mrs. Miss) _____
Check One

Address _____
Street City Zip Code

Telephone _____ Date _____

Volunteers needed as Conservatory Tour Guides, Gift Shop Personnel and for the Annual Plant Sale in May. Complete this request for the regular Membership Application form now.

FOCUS

on

Araucarias

In the
Boettcher Memorial Conservatory

PEG HAYWARD

THE OLDEST, tallest, and heaviest of living things are conifers. Some botanists believe that members of the *Araucaria* family, *Araucariaceae*, are vestiges of the primeval forest that once covered a vast part of the world. The trees in the Petrified Forest National Monument near Holbrook, Arizona, have been identified as *Araucarians*. Relatives of these primitive trees which lived 150 to 200 million years ago persist relatively unchanged. The family today consists of two genera, *Araucaria*, with twenty-five species of trees and shrubs, confined in the wild to the Southern Hemisphere, and *Agathis*, with twelve species, mostly from south of the equator.

Most widely known is *Araucaria excelsa*, Norfolk Island pine. These trees are not pines, but because of their resemblance to tall pines were given the name. They do not have needles like a pine, but overlapping scale-like leaves about $\frac{1}{2}$ inch long. This symmetrical evergreen tree may grow 200 feet tall. It has a unique pagoda style of growth with branches radiating in regular tiers around the trunk. The topmost branches form a perfect star, hence, it is often referred to as "star" pine. Each tier, usually of six, represents a year's growth. The bright green foliage is soft and pleasant to touch.



A. excelsa bears globose cones five to six inches in diameter, however, it seldom flowers or fruits in cultivation. The cone scales are without distinct bracts and each bears only one seed. Norfolk Island pine can be raised from seed, but the seedlings are not as branched as plants made from cuttings. Cuttings must be of the leading upright

shoots, since side shoots will not make symmetrical plants. Juvenile specimens have long been favorite indoor plants. In recent years thousands of Norfolk Island pines have been shipped from Hawaii for use as Christmas trees.

The most curious and the hardiest of the genus is *Araucaria araucana*, the Chilean-pine or monkey puzzle. It attains a height of 150 feet and a trunk diameter up to 5 feet. The dark glossy-green leaves are stiff with sharply pointed tips and wedge-shaped bases. The leaves closely overlap each other, clothing the snakelike branches and forming protection. This gave rise to the name, monkey puzzle, because it offers no handholds for climbing.

The male catkins are 3 to 5 inches long and the female cones are almost as big as a man's head. They contain up to 180 large edible seeds, which are used by the Araucarian Indians of Chile as a delicacy. The pale yellowish lumber is of fine texture. This species is highly popular as an ornamental in parks and gardens and may be seen in California and the Pacific Northwest, Great Britain, southern Europe and in other mild temperate areas.

The bunya-bunya, *Araucaria bidwilli*, is native to Queensland, Australia. The common name was given the tree by the Bushmen who relish the seeds. Each tribe has its own trees bequeathed from generation to generation, the only inheritance these people possess. This tree is sometimes called the Australian monkey puzzle because of its close resemblance to the Chilean-pine or monkey puzzle.

A. bidwilli may grow to a height of 140 feet. The mature tree is pyramidal and is composed of branches that droop and arch upward. Its sharp-pointed leaves grow in two rows and are smaller than those of *A. araucana*. The pineapple-like cones are up to a foot long

and may weigh as much as ten pounds. Its wood is strong, almost white, even-grained and useful for indoor work.

Another Australian species is *Araucaria cunninghami*, hoop pine, the name derived from its bark, which has horizontal cracks in encircling bands. This majestic evergreen tree attains a maximum height of 200 feet and diameter of 5 to 6 feet. Its form is unsymmetrical with branches of uneven length and leaves clustered near the tips. The hoop pine is a producer of resin and valuable lumber.

Besides the above mentioned species which are represented in Boettcher Memorial Conservatory collection, a recent addition is *Agathis robusta*, Queensland kauri-pine or Australian dammar-pine. *Agathis* is a Greek name indicating the ball or globe shape of the cone. Dammar is derived from its native name referring to the large quantity of wax-like resin it produces.

This massive, resinous evergreen tree may reach 150 feet high. It has a straight, smooth, slightly tapering trunk ordinarily free of branches up to two-thirds of its height. The crown is spreading and heavily branched. Young leaves are rosy in color and adult leaves are leathery, green, and lance-shaped. The tree bears staminate catkins two to four inches long and the globose, green fruiting cones are four to five inches long. The cones, usually on short lateral branchlets, are composed of numerous broadly obovate scales without bracts; each scale has a solitary reversed winged seed.

A. robusta is essentially an inhabitant of the rain-forest regions. The lumber of this species is of good quality but rather soft. It also produces the valuable resin known as copal.

Araucariaceae, a magnificent family of evergreens, is worthy of distinction among the conifers.

Persis M. Owen

How do we describe the many facets of a gifted personality in the brief span of a few words?

Here is a mother, a generous friend, an artist, a poet and a wise and public spirited citizen — Persis McMurtrie Owen.

Born in Denver, Mrs. Owen became closely identified with her beloved western countryside.

As Incorporator, Trustee and Planning Board Member of Cherry Hills Village she established and edited the *Village Crier* from 1947 to 1953. Her contributions to plans for this area are well known.

The fine restraint of design shown in Denver Botanic Gardens' Herb Garden gives proof of her skill as a

landscape architect and the owners of many distinguished gardens in Denver will remember her wide knowledge of plant material and her ability as an architect.

Her early publication of a book of poems illustrated with pen and ink drawings, the craftsmanship shown in the many imaginative gifts to friends and her final dedication to painting gave evidence of the diversity of her talents.

As time passes, however, those who knew her best and the larger circle of those whom she met daily in friendly intercourse will seek most to follow the example of this generous and compassionate heart.

A.R.G.



Botanic Gardens will be enriched by a memorial gift from the many friends of Mrs. Owen.

Control of Dutch Elm Disease

A Community's Responsibility

DR. JAMES R. FEUCHT,
C.S.U. Extension Associate Professor, Horticulture

BY THE END of September 1969, Dutch Elm Disease (DED) was found in eight Colorado communities. Just one year before it was known to exist only in Fort Morgan. More than 45 trees in Denver alone have the disease and must be destroyed. Cases of the disease have also found in Wheat Ridge, Arvada, Brighton, Boulder, Golden and LaSalle. This is a frightening prospect when one examines the statistics of the spread of the disease in midwestern and eastern communities which have already been confronted with the problem. Communities that did nothing to slow down the spread of the disease lost up to 99 per cent of their elms within a 10-year period. For Denver this would mean a loss of approximately 175,000 trees or about 75 per cent of the shade tree canopy. Other communities which took prompt action proved that something can be done to reduce the spread of this dread disease. This article is intended to outline the steps necessary for an effective DED control program.

How Did the Disease Get Here?

DED was first discovered in the Netherlands in 1919. It was actually believed to have originated in Asia.

The first cases of the disease in North America were discovered in Ohio in 1930 and were introduced accidentally in some veneer wood used for furniture manufacturing purposes. The disease quickly spread, probably by railway, to New Jersey in 1932, and into New York State by 1933. It was later found in Quebec, Canada, in 1944 and in New Brunswick in 1957.

During the past 12 years DED has moved steadily westward, moving rapidly in the native elm woodlots of the midwestern states until it reached eastern Colorado in late 1968. The rapid spread of the disease is due to the fact that there exists a peculiar relationship between the disease and the life cycle of a bark beetle, the European elm bark beetle (see figure 1). Because the disease has no cure, once it is inoculated into a tree by the bark beetle, control is aimed directly at measures to prevent the infection of healthy trees.

What Are the Effective Preventive Measures?

An effective control program must first be considered as a community-wide effort. It must involve three different but related programs: (1) Eradi-

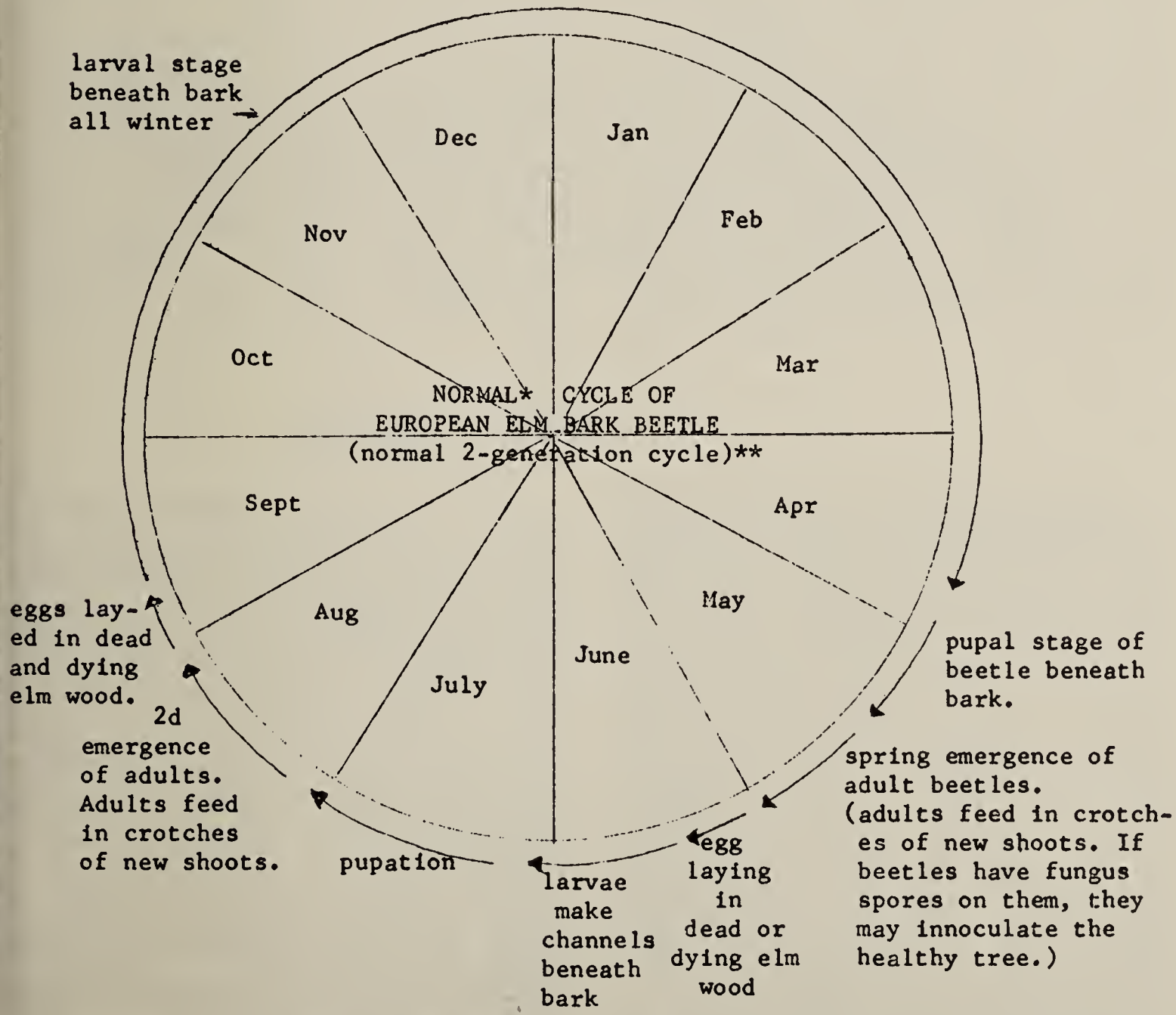
cation of the European elm bark beetle, principal vector in the spread of DED, through intensive, community-wide sanitation programs. (2) The prevention of the spread of the disease through natural root grafts from an infected tree to a healthy tree. (3) Chemical protection of *selected* trees to prevent the beetles from accidentally inoculating a healthy tree during their feeding period.

Sanitation

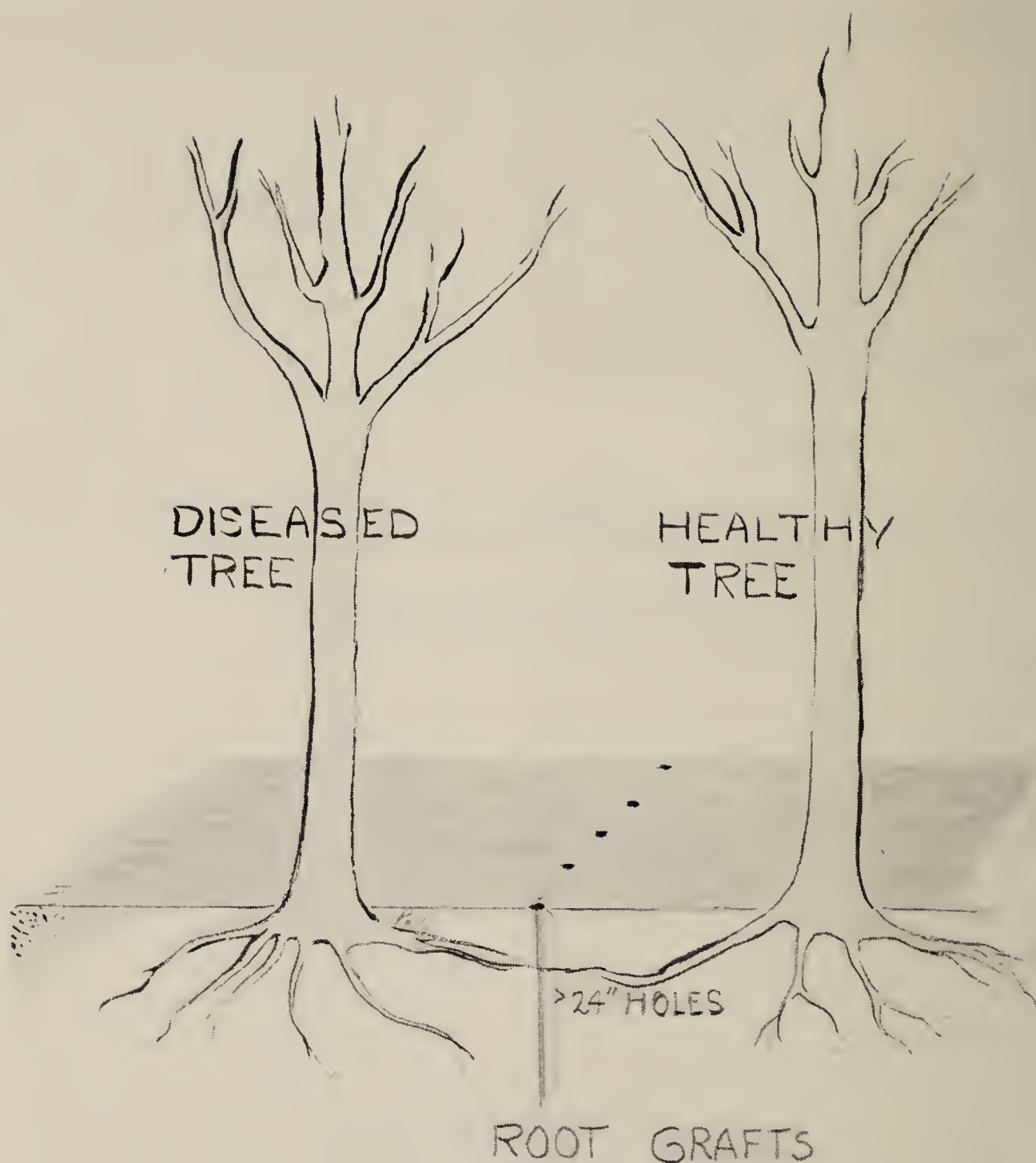
Sanitation is the key to slowing the spread. It should be a year-around pro-

gram. Because the European elm bark beetle prefers to breed in dead and dying elm wood, the first steps to eradicate the beetle involve the destruction of all dead and dying elm wood present in the community. This means limbs hanging in trees which may have been broken in our early October snowstorms, trees that become weakened from attack by other insect or disease pests, and elm wood stacked for fire-place uses. Any elm wood, as long as it is in a dead or dying condition and still has the bark firmly attached, will serve as brood wood for the beetles.

DUTCH ELM DISEASE CONTROL PROGRAMS
IN RELATION TO ELM BARK BEETLE CYCLE



*Emergence period usually overlaps the above "normal" cycle and may last more than 30 days.
 **In favorable years, three generations of beetles may occur. Adults appear in late June.



Just how effective a community-wide sanitation program can be was brought out in a recent publication of a study by the City of Syracuse, New York.¹ The report represents 20 years of observation on the spread and intensification of DED in the Syracuse area. Careful evaluation of their control program was made. It should also be pointed out that less than 1 per cent of the elms in Syracuse received spray applications, thus the sanitation program was the primary means of control.

¹ Miller, H. C., S. B. Silverbord, and R. J. Campana. 1969. Dutch Elm Disease: Relation of spread and intensification to control by sanitation in Syracuse, New York. Plant Disease Reporter, Vol. 53, No. 7.

In 1951 the first diseased tree was found in the city limits of Syracuse. Losses from the disease increased rapidly since sanitation on private property was only partial and it wasn't until 1958 that the State Legislature amended a law to allow municipalities to secure authority for the removal of infected trees on private property. With this authority, the city established an extensive sanitation program and as a result, during the period 1958 through 1964, held their annual losses from DED to less than 1 per cent per year. Because of lack of funds, however, sanitation practices were not continued beyond 1964. The effects of dropping

the sanitation program are borne out in that the year following (1965), 5.75 per cent of the elms were lost to DED. This increased steadily and in 1967, the last year of the study, the annual loss was about 15 per cent.

Thus, sanitation alone, while not stopping the spread of the disease, does tend to stabilize its spread and prevent epidemic proportions. The value of this, of course, is that effective sanitation allows *time* for a replacement program so that you don't lose all of your trees at once. New trees can then be replaced on a gradual basis.

From the standpoint of economics, sanitation may cost more in the long run, but annual costs to the community are kept to a minimum. Communities that did nothing and, as a result, lost almost all of their elm trees within a 10-year period, found that the cost of removal of dead trees alone was, on the average, five times higher annually than the cost for a sanitation program (see figure 2).

What About Root Graft Transmission?

It was not until about 1960 that the importance of root graft transmission was realized. It was found that this accounted for the majority of new cases of DED each year in some midwestern communities. These discoveries made it possible to obtain a greater degree of control.

Elm trees which are growing in close proximity to each other (within 50 feet) over a period of time will form biological unions (root grafts), and if one of the trees becomes diseased the disease may transmit directly through the root system into the adjoining healthy tree. Theoretically, the disease could spread along an entire city street in this manner. This could certainly be true if one would examine some of the parkways and streets, particularly in east Denver, such as 16th and 17th Avenues. Here you will find block after block of elms planted quite close together, some closer than 20 feet. Disease in just one tree in a row thus

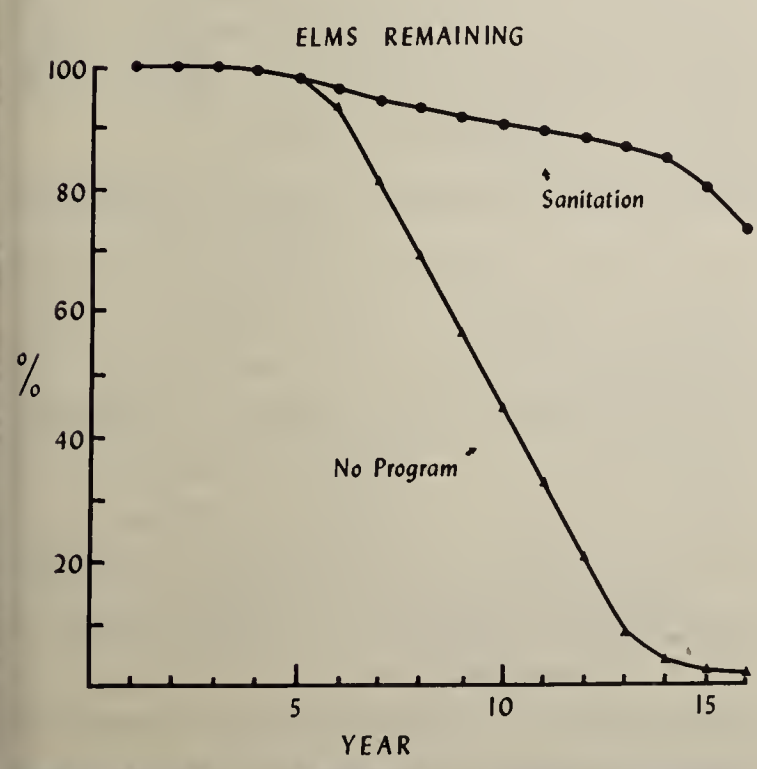


Figure 1. The course of Dutch elm disease in an elm population protected by a sanitation program and in an unprotected population.

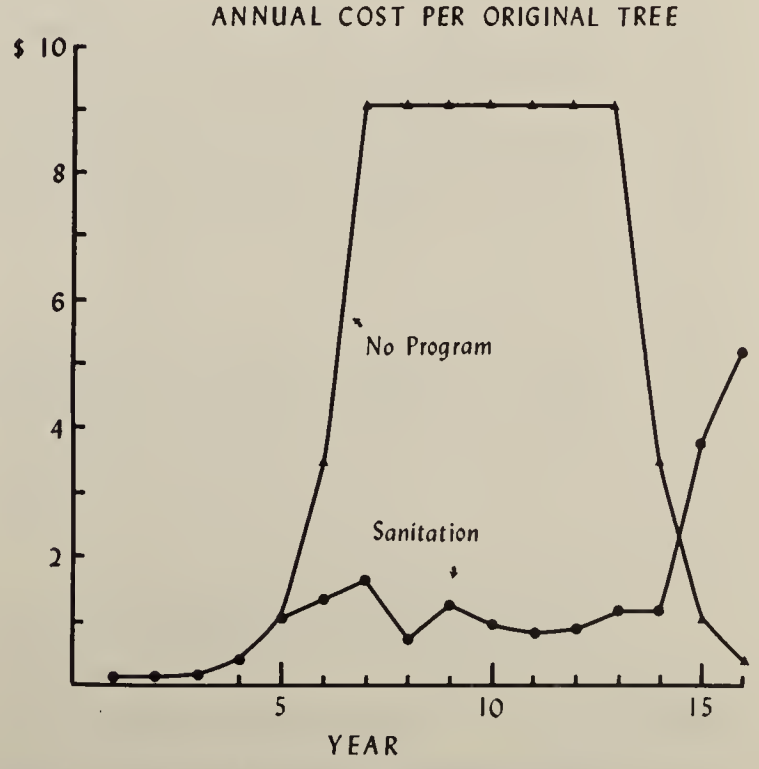


Figure 2. Annual tree removal costs of sanitation and of no program at \$75 per removal and infection rates shown in Figure 1.

could cause infection and death of the remainder of those trees.

The only way to prevent transmission through the roots is to create a barrier between diseased and healthy trees by severing or killing the roots. This can be done without harm to the healthy trees either by mechanical trenching, which is limited because of its cost and the probability of running into underground pipes and cables, or through the use of chemical barriers. The latter has been found to be quite effective in breaking the biological unions.

A fumigant, sodium n-methyldithiocarbamate dehydrate (SMDC), sold under the names of Vapam (Stauffer Chemical Company), and VPM (E. I. du Pont de Nemours & Company) has been found effective as a chemical barrier.

The procedure for applying SMDC is outlined as follows (refer also to figure 3):

(1) Mark out lines midway between the diseased tree and the adjacent trees to be treated. These will be the fumigation lines. They should extend well beyond the drip line of the trees and around sidewalks, hedges and other obstructions.

(2) With a soil probe, or preferably a power drill, drill 1-inch diameter holes 24 inches deep and 6 inches apart along these lines. Since elm roots also grow under sidewalks, slant several of the holes under these obstructions.

(3) Prepare SMDC solution by mixing one part of the chemical to three parts of water. *Follow all safety precautions outlined on the label. Wear rubber gloves when handling to avoid contact of the chemical with the skin and avoid breathing of the vapors.*

(4) Fill all of the holes with the prepared solution to within 2 inches of the top. A convenient method is to use a low pressure garden sprayer with

the nozzle removed in applying the material to the holes. Holes should be sealed to prevent loss of fumes. Clean the sprayer thoroughly after its use. These strips can be reseeded or sodded in about 2 to 3 weeks.

What About Chemical Control?

DDT has long been a major chemical applied during the dormant period to prevent the feeding of the beetle on healthy trees, but because of its proven undesirable effects on wildlife due to the long residual of the chemical, it is no longer recommended, at least for spraying on a community-wide basis.

Methoxychlor applied as a spray during the late dormant period can be of benefit in controlling the bark beetle. It should be emphasized, however, that while Methoxychlor is much less injurious to wildlife, it is also less effective and about four times as costly as DDT. In order to get good chemical protection, the spray must be applied so that every branch is completely covered with the material. This requires the use of professional equipment operated by professionally trained men.

Spraying on a community-wide basis is recommended *only* when appropriate sanitation and cultural measures have preceded or are performed concurrently with the spraying program.

What Can the Individual Citizen Do?

As your community develops DED control programs, these will be publicized in local news media. You as an individual citizen in that community can do much to support programs of the community. (1) See to it that your own elm trees are kept in good, healthy condition. Remove or have removed by a professional arborist any dead or dying elm wood or any elm trees that are in a dead or dying condition, par-

ticularly if that tree is known to have an infestation of elm bark beetle. You need not concern yourself whether the tree had DED or not. This will be determined by special laboratory tests and the samples will be taken by designated and qualified individuals in the community. (2) Control other insect pests such as the European elm scale and elm leaf beetle. These pests tend to weaken your elm trees, thus making them ideal "brood wood" targets for the European elm bark beetle. (3) If you are a member of a civic organization, or any organization for that matter, encourage them to launch a community-wide DED control program. Have them set up programs so that each member is well educated into the various aspects of the disease and

its control. Invite speakers knowledgeable in the subject to appear at meetings to explain how your organization can develop an effective community program.

To assist you in developing programs, contact your local county extension office, your city forester, or the author, 909 York Street, Denver 80206, phone 355-8306.

Remember — your trees are not a free community asset. Trees, like your automobile, your home, and other structures need periodic maintenance in order to keep them in top performance. Our trees cannot perform to their utmost in giving us cooling shade in the summer as well as aesthetic beauty if we neglect them. What would your community be like without them?

Denver Botanic Gardens

LECTURE SERIES

1970

FEBRUARY 19

DR. E. H. BRUNQUIST, Curator of Botany, Denver Museum of Natural History, and a member of the Emeritus Faculty of the University of Colorado School of Medicine; and MRS. LORAIN YEATTS, Photographer: **"Wild Plants in General and a Few in Particular."**

MARCH 19

DR. WILLIAM A. WEBER, University of Colorado Museum Herbarium Curator: **"Geographical Affinities of the Rocky Mountain Flora."**

APRIL 16

KENNETH MILLS, Biology Teacher, George Washington High School; Greenhouse Supervisor: **"Environment for Learning."**

These lectures will be presented in Boettcher Memorial Conservatory, 1005 York Street, at 8:00 p.m. The public is invited at no charge.

DRUMBEATS

*“Different drumbeats are heard
by each of us, we contribute dif-
ferent virtue, causes and effects.”*

THOREAU

LEE J. ASHLEY

FOR MANY years we have been growing *Gladiolus* at the Denver Botanic Gardens. In summers past we have spent hours making crosses attempting to create new and different varieties. Now comes that moment for the first variety crossed at the Gardens to get a name and be put out for the world to see.

Creating new varieties is always a challenge and coming up with names for them taxes the imagination. Here is a bit of the involvement that went into the naming of this glad.

Sometimes one thinks he knows people long before he meets them. When the day comes, one is astounded by the really great talents they do possess. Such was the case with Mrs. William Barton, the twenty-first President of the National Council of State Garden Clubs. I had long admired her for work contributed to the Floral Legend in America. She says that spring is a season of new beginnings, new hope and new endeavor. The fu-

ture stands before us bright and shining, promising new hours together, new friends, unexpected accomplishments and unannounced victories.

Since we are entering a new era with the advent of the “70’s” it seems natural to honor Osa Mae Barton. *Gladiolus* Osa Mae is our token of appreciation.

May it live up to its namesake and the luster of its parents, “Parfait x Pactolus,” two of the greats of the Glad world. Osa Mae has already been Grand Champion at the Denver Shows and has won many seedling awards. It is a rich, vibrant salmon, with rich gold lip-petals and an intense bright red blotch. All of this is on a tall spike of 24 buds with 8 open florets! It was created at the Denver Botanic Gardens by our own flower man, Lee J. Ashley.

This honor will be presented to Mrs. Barton at the Forty-First Annual meeting of the National Council of State Garden Clubs in Chicago, May 21, 1970.

Suggested Trees

For the Denver Area

GEORGE W. KELLY**

- **Acer platanoides*, NORWAY MAPLE. Sun scalds when young and may winter-kill. Not very tough. New varieties like Emerald Queen should be included. Varieties such as Cleveland and Summer Shade should be tried.
- Acer platanoides* Schwedleri, SCHWEDLER MAPLE. Same difficulties as Norway. A.p. *Columnare* should be included.
- Acer saccharinum*, SILVER or SOFT MAPLE. Quick growing and shallow roots, brittle and subject to chlorosis in alkaline soils, but with all its faults may be our best fast-growing tree. Blair maple and a pyramidal form should be included.
- Acer saccharinum* Cl. CUTLEAF WEEPING MAPLE. Same advantages and disadvantages as the species but the weeping habit makes this a beautiful, low-headed tree.
- Betula nigra*, RIVER BIRCH. Seems the hardiest birch for us. In leaf later in spring and drops leaves earlier in fall.
- **Catalpa speciosa*, WESTERN CATALPA. Large leaves, attractive flowers, ornamental pods, all of which fall on the ground at some time. Most loved and hated of trees, depending on viewpoint.
- Catalpa* Cl. PURPLELEAF CATALPA. Same as above.
- **Celtis occidentalis*, COMMON HACKBERRY. Hardy, elm-like, hard to transplant.
- **Fraxinus pennsylvanica lanceolata*, GREEN ASH. Medium slow, hardy.
- F. p. l.* MARSHALL SEEDLESS. Similar to species but seedless.
- AUTUMN PURPLE. Similar but purple leaves in fall.
- F. excelsior hessi*, HESSE ASH. Should be used.
- F. americana*, WHITE ASH. A more shapely tree than Green Ash but not completely hardy in some places.
- **Gleditsia triacanthos inermis*, THORNLESS HONEY LOCUST. Hardy, little storm breakage. Drought resistant.
- G. t. i.* Moraine, Majestic, Skyline, Shademaster are of uniform shape, thornless and podless. All must be trained when young to become high-headed.

*Indicates on the Denver City Forester's list.

**With the spread of Dutch Elm Disease to this area the Editorial Committee was anxious to provide a list of desirable trees hardy in this area or worth trying as replacements for threatened elms or as new plantings in our landscapes. Mr. Kelly has given these suggestions.

- **Gymnocladus dioica*, KENTUCKY COFFEE-TREE. Very hardy but hard to transplant. Informal shape and pods may be problem.
- Juglans cinerea*, BUTTERNUT. Not well known, but appearance is cleaner than Black Walnut. Slow-growing with smooth, light bark.
- J. nigra*, BLACK WALNUT. Slow-growing, rugged, hard to transplant because of taproot. Nuts may be a problem.
- Morus alba tatarica*, MULBERRY. Might be a little tender and short lived in some places. Its fruit can be messy but there are fruitless kinds and this tree can give needed variety.
- Prunus serotina*, BLACK CHERRY. May need some protection in starting. Should be used more.
- **Quercus macrocarpa*, BUR OAK. Hardy, slow growing, no fall color.
- Quercus borealis*, RED OAK. Good fall color. Must have good soil to succeed. Difficult to transplant.
- Q. palustris*, PIN OAK. Similar in qualities to Red Oak.
- Q. robur*, ENGLISH OAK. Slow, naturally low branched and spreading.
- Sophora japonica*, JAPANESE PAGODA TREE. Spreading habit, good flowers, needs some protection in starting. Green trunk.
- **Tilia americana*, AMERICAN LINDEN. Symmetrical shape, has tender bark. One of the best.
- T. europaea*, EUROPEAN LINDEN. Much the same as American, smaller leaves.
- T. cordata*, LITTLELEAF LINDEN. Spreading and informal, slow.
- T.c. Cl.*, GREENSPIRE. Faster growing than species.
- T. euchlora*, CRIMEAN LINDEN, Cl. REDMOND. Tall, slender, hardy.
- T. e.* CHANCELLOR should be tried.

* * * * *

LARGE TREES to be used occasionally as street trees under special conditions but mainly for off-street planting. Problems are hardiness, low-branching, suckering or messy fruits.

- Acer saccharum*, SUGAR MAPLE. Unreliable hardiness.
- A. pseudo-platanus*, SYCAMORE MAPLE. Unreliable hardiness.
- A. negundo*, BOX-ELDER. Hardy and quick growing but tends to become ragged with age. Can be used where nothing else grows.
- Ailanthus altissima*, TREE-OF-HEAVEN. Tolerates bad soil and air. May become weedy if not regularly trimmed. Suckers. With care may become a beautiful tree.
- Betula papyrifera*, PAPER BIRCH. Low-headed and more difficult than some other birches.
- B. pendula*, EUROPEAN WHITE BIRCH. Not the hardiest.
- B.p. gracilis*, CUTLEAF WEEPING BIRCH. One of the most beautiful birches and reasonably hardy. Its weeping habit makes it undesirable for street planting.
- Aesculus hippocastanum*, HORSE-CHESTNUT. Slow, requires some protection but makes a very symmetrical and beautiful tree. Flowers spectacular. Fruits might be objectionable.
- Liquidambar styraciflua*, SWEET GUM. Grows in some locations.
- Platanus occidentalis*, SYCAMORE. Slow-growing, difficult, has diseases but many have survived. Interesting seed balls.

Populus, POPLARS and COTTONWOODS. Most of the poplars are fast growing, may be short-lived and are easily broken in storms. Some selected species and varieties still have a place if they have regular care and plenty of room.

P. sargenti, PLAINS COTTONWOOD. Much hardier than the Carolina.

P. s. robusta, FALSE LOMBARDY. Has a definite place.

P. s. siouxland, POPLAR. A superior selection.

P. fremonti, FREMONT POPLAR. Similar to *sargenti*.

P. angustifolia, NARROW LEAF COTTONWOOD. For higher altitudes.

P. simoni, SIMON POPLAR. Hardy, erect, narrow, disease-resistant.

P. andrewski, ANDREW'S POPLAR. Similar to Lance-leaf or Wyoming.

Quercus alba, WHITE OAK. Generally intolerant of our soils.

Q. biocolor, SWAMP WHITE OAK. Has been found in Denver.

Q. coccinea, SCARLET OAK. May be as good as Red or Pin.

Salix alba tristis, GOLDEN WEeping WILLOW. Brittle, subject to many diseases and insects but a beautiful tree where there is room.

Ginkgo biloba, MAIDENHAIR TREE. Difficult but there are several specimens that have survived in the Denver area.

* * * * *

SMALL TREES. Useful under certain conditions such as under wires, in restricted spaces and around buildings. Many are attractive for flowers, fruit or stems. Those that are low branching or weeping are not recommended for street use.

Aesculus glabra, OHIO BUCKEYE. Slow-growing, good flowers and form. Needs good soil.

A. octandra, YELLOW BUCKEYE. Same.

Alnus glutinosa, EUROPEAN ALDER. Needs some protection. Some have survived in Denver area.

A. tenuifolia, MOUNTAIN ALDER. Requires moist soil. Naturally many stemmed but is easily trimmed as a tree. Native.

Catalpa ovata, CHINESE CATALPA. Flowers, fruit and leaves are more attractive than Western but tree grows more slowly.

Crataegus, HAWTHORNS. Subject to fire blight and host of cedar-hawthorn rust. Flowers and fruits are attractive.

C. mollis, DOWNY. Largest size, spreading habit, very useful.

C. arnoldiana, ARNOLD. and *C. phaenopyrum*, WASHINGTON can be trimmed as small trees. TOBA is hardy and adaptable.

Eleagnus angustifolia, RUSSIAN OLIVE. Hardy, very versatile, informal habit. Can be trimmed in any shape.

E. a. orientalis has possibilities.

Koelreuteria paniculata, GOLDENRAIN-TREE. Beautiful flowers and fruit, informal shape. Hardier if grown on north.

Malus, CRABAPPLES. May be trained to single leader and high-headed for street use. Attractive flowers and fruits.

Dolga, hardiest of the white flowering.

Hopa, hardiest of rose-pink flowering.

Ely, Red Vein and Red Silver are hardy rose-pink flowering.

Jay Darling, Spring Snow, Radiant, Purple Wave, Irene are other varieties.

Bechtel has large pink flowers but blights.

Prunus blireiana (cerasifera), NEWPORT PURPLE PLUM. May be trained as tree.

Prunus padus, MAYDAY TREE. Similar to chokecherry but does not sucker and is not as hardy.

P. melanocarpa, CHOKECHERRY. White flowers, black fruit, may be trained to single stem. Amur is similar. Shubert's has red leaves.

Populus tremuloides, QUAKING ASPEN. White bark, suckers and is host of scale insects.

Pyrus ussuriensis, *p. ovidea*, USSURIAN PEAR. Red in fall.

P. calleryana, BRADFORD PEAR. Nice shape and bloom.

Sorbus aucuparia, EUROPEAN MOUNTAIN ASH. Upright, very attractive with bright fruits. May blight and sun scald.

S. hybrida, OAKLEAF MOUNTAIN ASH. Same as European.

Syringa pekinensis, CHINESE TREE LILAC. Informal, with white flowers.

MY *favorite* TREE

VENOLA LEWIS BIVANS

MY FAVORITE tree is the cottonwood. I grew up on the plains and had there been no cottonwood trees, it would have been a dreary place to live. To the pioneers who came west, the sight of cottonwoods along the streams brought hope and reassurance in a barren land. The trees supplied logs, lumber, and firewood.

As a child I played beneath the cottonwoods. There was a large grove all around our house and I used to hear people say, "I wouldn't want those trees in the yard. They make so much noise when the wind blows." Yes, they respond to the elements — they roar and thrash, whisper, tinkle, and patter. Their shiny, cool leaves make a welcome shade and shelter. Their large

spreading limbs support tree houses and swings and the higher branches are homes for orioles, vireos, and singing cicadas.

Several of the very large old trees by the river were hollow inside. One was our childhood post office where we mailed letters to each other. Another was the church and we would sit under its shade and listen to the preaching in the rustle of the leaves. Another large hollow tree was the home of a family of raccoons, their tracks plainly showing where they went into the hollow and scratched up the trunk. Screech owls and woodpeckers also found suitable nesting places in the holes above.

The red and greenish tassels in the spring were about the only flowers we



ould find on May Day to put in our
 lay baskets, and when the flowers
 opened and the sticky calyx cases fell
 to the ground they stuck to our bare
 feet and had to be scraped off with a
 knife. I remember once getting a visitor
 from the east to chew some of the buds,
 telling him it was like spruce gum. It
 was days before he got the last of that
 bitter resin out of his mouth. When the
 rings of seed pods matured we gath-
 ered some to use for eggs in the play

house and set under our hand-carved
 hens. As they dried they broke open,
 hatching into fluffy white chicks.

If I were planting a tree in my yard
 here in Boulder, it would probably not
 be a cottonwood. There would hardly
 be room for its majestic growth, but I
 would not exchange these memories for
 the best species the nurseryman can
 now furnish. They would never have
 filled the place of the cottonwoods.

NEW DREAMS, NEW REALITY

AN \$850,000 Development Fund Drive, to complete the final phase of the long-range Master Design for Denver Botanic Gardens, is under way with John D. Hershner, President of Denver-U.S. National Bank, as general chairman.

With reports from only 20 per cent of the individuals, corporations, foundations and other interested organizations to be contacted, \$502,427 had been pledged by early January. Members of the Board of Trustees set their own goal of \$200,000 and at last report their pledges had reached \$220,000. Division chairmen of the campaign are George Cannon, President of Bonanza Trucking Company; R. Earle Honnen, President of McCoy Company; James E. Wilson, Vice-president of Shell Oil Company; and Alfred A. Wiesner, Executive Partner, Boettcher and Company. In all, 125 dedicated volunteers are serving the Gardens in this effort.

Pledges are accepted in money, stocks and other property. Gifts can be made as memorials or living tributes. Gifts-in-kind have also been made — \$50,000 in plants by Colorado nurserymen, heavy equipment to be furnished in various phases of development, as well as donations of concrete and other essential materials.

The completion of the Master Design will be a major step in advancing educational, cultural and research assets of this region. The present tem-

porary areas of the York Street grounds will be replaced with permanent education and research display areas necessary to develop fully the educational program of the Botanic Gardens: living laboratories, outdoor lecture and research areas, model gardens for home owners and gardens typical of other countries of the world. In the completed Gardens circulation paths will lead through an enlarged collection of specimen trees, other woody plant groups of annuals and perennials artistically exhibited in new outdoor instruction areas, test gardens and demonstration plots.

Portions of the grounds are being contoured and reshaped now in accordance with the Master Design to provide for eventual display water systems — fountains, a canal and lake — to be tied into the existing pond of the Gates Memorial Garden. Funds will be used for additional greenhouses for production and research. A gatehouse will serve as an information and contact center for visitors, a small building planned for refreshments and rest, and a service building and paved storage yard will be provided for equipment.

Funds will also be used to acquire land for long-range parking facilities to expand the Children's Garden program and to establish a special contingency maintenance endowment fund.

B.E.



*Exotics
of
Colorado—*
Pinus strobus

DR. HELEN MARSH ZEINER

MANY of the evergreens planted as ornamentals in the plains towns of Colorado are native to the state, but others are exotics brought here from other parts of North America or even from other continents.

One of these exotics is the eastern white pine, *Pinus strobus*. In Denver this tree is well-established along some of the city parkways (such as on Downing Street near Speer Boulevard) and

in some city parks (Washington Park, for example). There is a single specimen tree near Mary Reed Library on the University of Denver campus. One sometimes finds an eastern white pine planted on private grounds where a very large tree can be accommodated.

Pinus strobus is a 5-needle pine. This means that the needles are borne in clusters or bunches of five. The genus *Pinus* is characterized by the habit of



bearing needles in bundles enclosed at the base in a papery sheath. The number of needles in a bundle may be two, three, or five. This is an important feature in the identification of pines.

A unique pine which is an exception to the rule that pines have two to five needles in a bundle is *Pinus monophylla*, singleleaf pinyon pine, which has one needle to a "bundle." This pine is to be found on dry foothills and mountain slopes mainly in Nevada, California, Arizona, and Utah.

The 5-needle pines as a group are referred to as the white pines. In Colorado, two indigenous 5-needle pines are to be found on wind-swept ridges or at high altitudes near timberline. These representatives of the white pine group are *Pinus aristata*, bristle cone or foxtail pine, and *Pinus flexilis*, lim-

ber pine or Rocky Mountain white pine.

Eastern white pine can be easily recognized by its very soft, slender, flexible blue-green needles which may vary from 3 to 5 inches in length. Since this tree is a white pine, the needles are always in clusters of five.

The narrow cones are from 4 to 8 inches long, with thin, rounded scales. Each cone has a long stalk. They are very graceful, attractive cones much in demand for use in Christmas decorations. It is not an uncommon sight when the cones have dropped, to see otherwise most dignified ladies gathering fallen cones in the parks to use in wreaths and other trimmings.

The species name *strobus* is derived from Latin and Greek words which mean "pine cone."

Grown in Denver strictly as an ornamental, eastern white pine is an important timber tree in its native habitat which centers around the Great Lakes and ranges from New England to Minnesota, into the Appalachians and into Canada. The white pine forests are transitional between the northern spruce forests and the deciduous forests to the east and the grasslands westward.

When the first white settlers came to this country, the white pine forests were magnificent. Most trees were two to three hundred years old and 30 to 40 inches in diameter. Some as much as 6 feet in diameter were reported. Eastern white pine is the largest northern eastern conifer and is said to be second only in size to the sugar pine of California.

The wood was easy to work and durable, and the forests, which no doubt seemed endless to early lumberers, were cut with little thought of the future. Many times fire followed careless lumbering, and the original



white pine forests were nearly destroyed.

Now, under controlled cutting, trees are usually harvested when they are sixty to eighty years old and 12 to 17 inches in diameter.

In early practice, the lumber was used for ships' masts and for building. It has many other uses now, such as for boxes and crates.

From early times the beauty of this tree was recognized. It was planted in England 200 years ago on the estate of Lord Weymouth, and in England and Europe where it is extensively planted as an ornamental, it is known as Weymouth pine.

Eastern white pine is the state tree of both Maine and Minnesota.

White pine blister rust, a disease brought to this country from Europe, has become a serious disease of all 5-needle pines. White pine blister rust requires gooseberry or current as an alternate host. One control for the disease is to eradicate gooseberries and currants in the vicinity of the white pine. You may remember a few years ago that there was a program to eradicate these plants in Colorado where they were close to our native white pines.

Eastern white pine is sometimes hard to establish and it does need irrigation. Once established, it seems to grow well. Because of its size it is not suitable for most homes, but it is a tree to know and enjoy in the parks.

Avoid Cold Water 'Shock'

Tap water runs pretty cold during the winter — so it's best to use water at room temperature to avoid shocking your plant collection. Use enough water, at the same time every day, to leach harmful salt accumulations out through the porous sides of your clay pots, the only containers that provide thorough, natural drainage to keep roots from drowning.

FREEZE DAMAGE

DR. JAMES R. FEUCHT

The sudden temperature drop to as low as 3° which occurred between the two snowstorms in early October appears to have resulted in extensive damage to landscape plants. Just how extensive the damage is may not be certain until spring or into the summer.

One of the first signs of injury noted was a browning of the needles in pine, including our native ponderosa pine and some even showed up in pinyon and bristlecone pine. The most severe injury was apparent in recently transplanted plant material where in some cases this past season's growth turned brown. This was true in some cases with newly transplanted spruce, and occasionally even in junipers.

In deciduous plants, death of the phloem and possibly even the cambial area occurred in certain trees and shrubs, particularly where branches had not been protected by the heavy

snow. Damage was most evident in those branches which were in a more vigorous growing condition. Even normally hardy plants like the European cranberry bush and certain varieties of crabapple such as "Vanguard" and "Radiant" showed damage.

The reason the injuries occurred was that the plants were not physiologically prepared for the sudden temperature change. Normally, the water in plant tissues becomes chemically "bound" during the hardening-off process. Many plants did not have the opportunity to become hardened.

Deciduous plants were also caught unprepared from the standpoint of losing their leaves, and as a result many trees and shrubs retained the now browned leaves late into the winter. For normal leaf drop, the plant undergoes gradual changes in response to decreasing day length and slowly de-

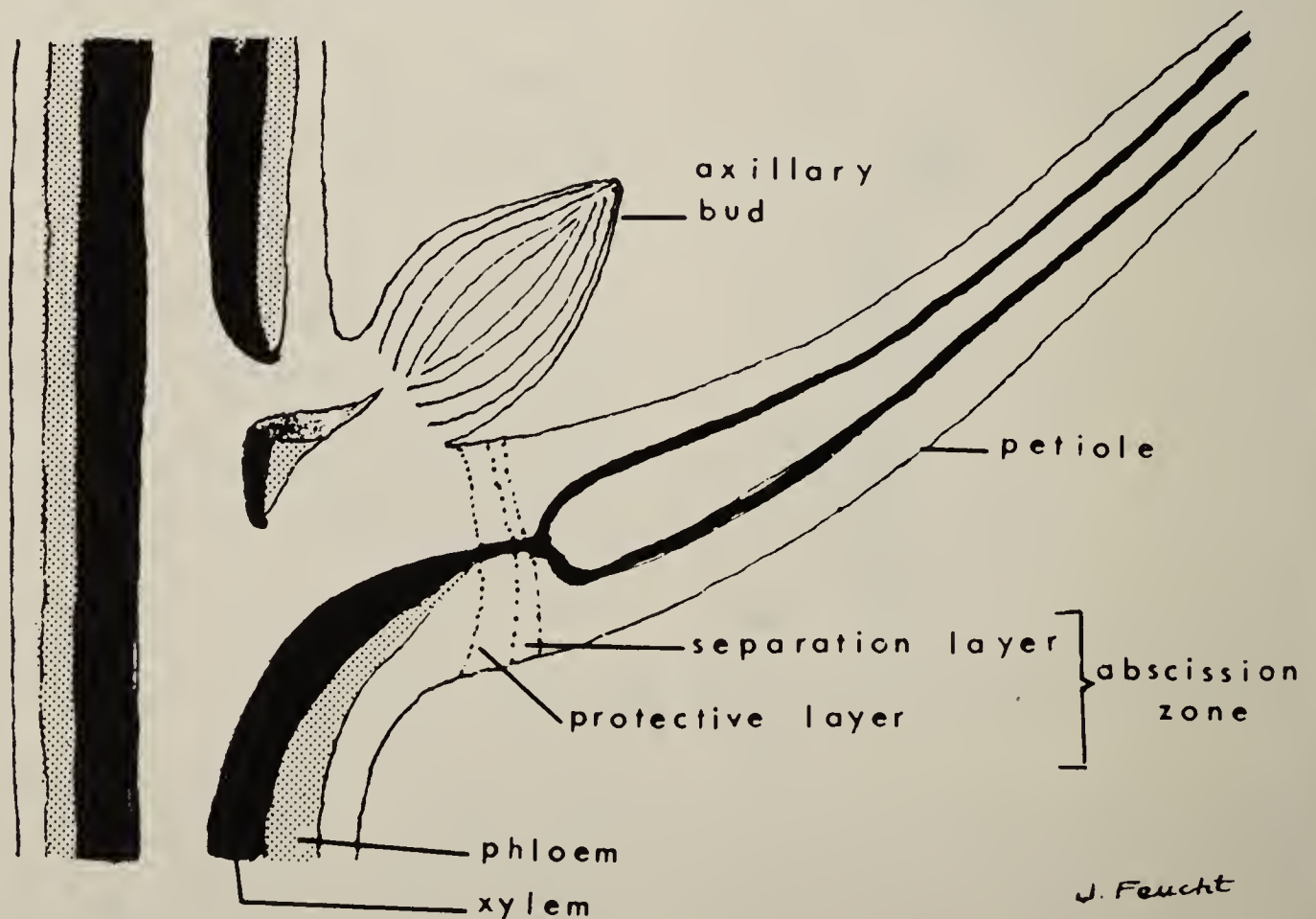


Figure 1 — Diagram showing longitudinal view of abscission zone in woody plant. Separation layer had not completed development in many plants when October freeze occurred.

creasing night temperatures. This produces a chemical change in the plant which correspondingly causes the development of an abscission zone near the base of the petiole. (See Figure 1.) Leaf drop occurs when the abscission zone develops and a layer or perhaps even several layers of cells dissolve.

There is little you can do about the freeze damage and the best advice is simply to wait until spring or early summer before anything is done. It will be much easier at that time to determine which branches are injured and need to be pruned out and which can be saved. It is quite possible, and in fact has happened before, that some of the freeze damage, while appearing to kill the twigs, actually did not kill the

cambial area. In such cases a new phloem, the food conducting tissues of the plant, will be replaced when the resumption of growth occurs in the spring.

Nurserymen have been advised not to try to sell questionable material. Even if the plants did survive the freeze with only minor damage to the phloem, the shock in transplanting may be too great for such plants. As of February 1, 1970, an inventory of nursery stock showed losses around \$1,100,000. This figure will probably increase. Losses to established plantings are difficult to assess and undoubtedly will run into several million dollars in metro Denver alone.

25th Horticultural Congress To Convene At Miami Beach In 1970

Miami Beach, Florida, will be host to the 25th American Horticultural Congress, November 1-4, 1970, with the Deauville Hotel as headquarters.

Four national horticultural organizations will meet concurrently with one or more joint sessions: The American Society for Horticultural Science, Dr. James M. Beattie, president; the Garden Writers Association of America, Mrs. Bea Jones, president; the American Association of Botanic Gardens and Arboreta, Dr. Louis B. Martin, president; and the American Horticultural Society, Mr. Fred C. Galle, president.

The joint session will mark the largest concurrent gathering of these segments of horticulture in the history of these United States. Horticultural scientists, educators, writers, arboreta and garden managers, commercial interests and amateur gardeners from novice to expert will meet together for an over-

all view of Horticulture — U.S.A.

Dr. John Popenoe, director of the Fairchild Tropical Garden in Miami, is chairman of the 25th American Horticultural Congress Committee.

Holiday Aftermath

With holiday decorations out of the way, doesn't the house have a bare and woebegone look? The best remedy for that is to select a large foliage plant or two at your local florist — one that doesn't require much light if you plan to use it in the interior of the room. Choose a dracaena, Chinese evergreen, or rubber plant, in a clay pot for easy care. Water regularly to keep the soil moist but not wet. The porous clay pot walls evaporate excess moisture into the air thus acting as insurance against overwatering.

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January 1970

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The Green Thumb

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DENVER, COLORADO

This is a non-profit organization supported by municipal and private funds.

A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden center around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

SPRING 1970



THE COVER

FIRST PRIZE Hybrid Tea AARS award winner for 1970
Deep rose-pink to light red
Press Service George E. Rose

THE GREEN THUMB

VOL. TWENTY-SEVEN, NUMBER TWO

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SPRING 1970

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By becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the use of the books in the Helen K. Fowler Library at Botanic Gardens House.

For further information write to Membership Chairman, Botanic Gardens House, 909 York Street, Denver, Colo. 80206, or call 297-2547.



State of Colorado

EXECUTIVE CHAMBERS

DENVER

EXECUTIVE ORDER

PROCLAMATION

ROSE WEEK

June 19 - 22, 1970

WHEREAS, The American Rose Society is the largest special plant society in the United States and is a non-profit organization; and

WHEREAS, The American Rose Society, maintains liaison with field societies and rosarians through strategically placed personnel called Consulting Rosarians; and

WHEREAS, cooperative research programs on rose growing problems is maintained by the American Rose Foundation; and

WHEREAS, the motto of the Society is "lets grow roses for fun" and the objective of the Society is to promote the growth of more and better roses; and

WHEREAS, The Denver Rose Society, organized in 1947, will host the 1970 National Convention and Rose Show of The American Rose Society on June 19 - 22, 1970,

NOW, THEREFORE, I, John A. Love, Governor of Colorado, do hereby proclaim the period of June 19 through June 22, 1970 as

ROSE WEEK

in Colorado.



GIVEN under my hand
and the Executive Seal
of Colorado, this Third
Day of February, A. D.,
1970.

John A. Love
John A. Love
Governor

American Rose Society Meets in Denver

ROSS V. LAHR
ARS Convention Chairman

GOVERNOR John A. Love has proclaimed June 19 to 22 Rose Week in Colorado in honor of the National Spring Convention and Rose Show of the American Rose Society which will be held in Denver with the Denver Rose Society as host. About 700 rosarians from the United States and Canada are expected to meet with nationally and internationally recognized experts in the fields of rose hybridization and research to discuss their favorite subject, roses. At the Rose Show, about 1500 entries will be made in competition for 43 trophies including one international and four national awards.

Many programs are planned to whet the interest of rose enthusiasts and are open to registrants (not necessarily members of the American Rose Society). Convention headquarters will be at the Brown Palace Hotel with programs in the grand ballroom. Panelists for the opening discussion will be Dr. Griffith J. Buck, researcher from the consumer standpoint at Iowa State University; Dr. Eldon Lyle, ARS Vice-President and researcher in rose production in Texas; Dr. Dennison Morey from General Bionomics, Inc., who aids amateur hybridizers and researchers; and Robert V. Lindquist, internationally known for his hybridizations and new introductions. Fred Edmunds, nurseryman from Wilsonville, Oregon will be moderator.

George and Sue Kelly, now living at Cortez, Colorado, will present "Finding Beauty in Unusual Places," an illustrated slide program. Mrs. Kelly is an accredited judge and past president of

the Denver Rose Society. Mr. Kelly, long-time editor of *The Green Thumb* and author of *Rocky Mountain Horticulture*, is recipient of many civic and national awards. Dixie Freudenberg of Colorado Springs will give her nationally acclaimed program, "Fashions and Flowers." Charlie Dawson, garden writer and rosarian from Louisville, Kentucky will consider "Patience — Ingredient for Growing Roses," and Ernest Williams, hybridizer who has developed and introduced many miniature varieties, will discuss "Miniature Roses and How to Use Them." "This Bloomin' World," a timely film by Eastman Kodak, is also scheduled.

A highlight of convention activities will be the Rose Show, staged in the lobby of Colorado National Bank. It will be open to the public without charge after 2 p.m. Saturday and all day Sunday. Here, exhibitors in horticulture and artistic arrangement classes will compete for the 43 trophies including 35 awards sponsored by local individuals, societies and businessmen. Rose society members throughout the nation will compete and novices or non-members are eligible to compete in certain classes.

National trophies include the Nicholson Perpetual Challenge Bowl awarded for a collection of nine hybrid teas of different variety; C. Eugene Pfister Memorial Trophy, one single grandiflora bloom; Dr. T. Allen Kirk Memorial Trophy for three hybrid tea roses of one variety in bud, partially open and fully open; and the Nora Katherman Memorial Arrangement

Trophy. The New Zealand Rose Society offers the coveted Kiwi award, a plaque for four individual hybrid teas and two floribunda sprays. The J. Horace McFarland Rocky Mountain District Memorial Trophy recognizes the grower of a collection of five hybrid teas of different variety.

Rose Show schedules may be obtained at the Denver Botanic Gardens Gift Shop or from Dr. Warren Kirkley, 12 Twilight Drive, Denver. A refriger-

ated truck is being made available to accommodate roses shipped to Denver from out-of-state gardens.

Assisting the Denver Rose Society in staging this convention and rose show and also sponsoring trophies are the Loveland (Colo.) Rose Society, Boulder (Colo.) Valley Rose Society, Arapahoe County Rose Society, Englewood, Colorado, Utah Rose Society at Salt Lake City and Nebraska State Rose Society at Lincoln.

Rose Show — Colorado National Bank

Saturday, June 20

6:30 A.M. to 10:00 A.M. — Rose Show entries received.

10:30 A.M. to 12:30 P.M. — Judging.

1:00 to 2:00 P.M. — Show open to convention registrants.

2:00 to 6:00 P.M. — Show open to public. No charge.

Sunday, June 21

10:00 A.M. to 5:00 p.m. — Show open to public. No charge.

Convention Programs — Brown Palace Hotel Ballroom

Open to all registrants. Registration fee is \$5.

Saturday, June 20

Meetings of officials and Rose Show as above.

Sunday, June 21

9:00 A.M. Panel — Researchers and Hybridizers.
Dr. G. J. Buck, Dr. Eldon Lyle,
Dr. Dennison Morey, Robert Lindquist.
Fred Edmunds, moderator.

10:30 A.M. Finding Beauty in Unusual Places.
George and Sue Kelly, Cortez.

2:00 P.M. Patience — Ingredient for Growing Roses.
Charles "Doc" Dawson, Louisville, Ky.

7:00 P.M. Fashions and Flowers.
Dixie Freudenberg, Colorado Springs.

Monday, June 22

9:00 A.M. Miniature Roses and How to Use Them.
Ernest Williams, Dallas, Texas.

10:30 A.M. This Bloomin' World.
Eastman Kodak, Rochester, N.Y.

1:30 P.M. Meeting of Judges and Consulting Rosarians

3:00 P.M. New Rules on Modern Rose Arrangements.
Mrs. Wm. H. Pavey, Xenia, Ohio.



ALL-AMERICA

Rose Selections

ORIGIN OF AARS

ROSE VARIETIES were brought to America by many of the colonists. Soon eastern nurserymen offered long lists of European varieties. From the Civil War through the 1920's rose growing and varieties increased in the United States until there were several thousand varieties being offered. Many of these were duplicates, or so closely resembled each other that it was almost impossible to tell them apart. Many were inferior in quality and the situation was a very confused one for the home gardener who wished to obtain satisfactory roses. No overall standard existed for comparing the merits of one variety with another and, more often than not, the rose which approached the spectacular in one section of the country was completely unsuited for growing in another section.

At the same time, the rose hybridizers who developed new varieties were complaining bitterly that there was little possibility of obtaining compensation for their long and painstaking work. Any plant could be propagated and reproduced without any compensation ever going to the hybridizer. There was

little incentive toward experimentation and creation of new varieties during this period.

Finally, in 1930, the United States Plant Patent Act was passed. This act permitted the inventor of a new plant to control his new creation for 17 years. During this period he could collect a royalty for all direct offspring of his plant that was reproduced by others. The Plant Patent Act offered rose breeders a real opportunity for compensation for the many years of work involved in producing worthy rose hybrids. However, the plant patent law did not require a new plant to be better than existing plants. It only required that the new plant be different in appearance or growth habit.

It became apparent to all those interested in roses, including the American Rose Society, rose hybridizers, and nurserymen that something had to be done to set up an organization that could test and determine the relative merits of roses before they were offered to the public.

In 1938, a group of leading rose growers and introducers developed the All-America testing system which provided for the testing of new varieties

over a two-year period under widely varied conditions of soil and climate.

PURPOSE AND OBJECTIVE OF AARS

All-America Rose Selections is a tax-exempt non-profit organization. It does not breed or produce roses; it does not sell roses; it does not price roses. Its sole functions are to test new rose originations, to give recognition in the form of an All-America award to the new roses which have proved outstanding in the trials, and to acquaint the gardening public of this nation and Canada with award-winning roses.

The objectives established in 1938 are the same goals which guide the working of the AARS today. The overall objective is establishing in the minds of home gardeners that all roses bearing the AARS seal may be grown anywhere in the United States with reasonable expectancy to top performance. These award winners of the many hundreds of rose varieties tested are worthy to be planted in the gardens of the nation.

GENERAL INFORMATION

Any rose receiving an All-America award must have an outstanding set of qualities. Only those varieties scoring in first or second place in the 4 classes are even considered. Occasionally not even one is considered distinctive enough to be worthy. At times firms entering varieties which score up near the top, or which do unusually well in certain areas feel justified in introducing those varieties. The great majority, which receive relatively low scores are no longer considered by the firms which submitted them and are dropped.

For the past 29 years that the All-America Rose Selections has been in existence, at least one rose variety has been named an award winner each year

with the exception of 1951. In that year it was determined that there was no rose in the test which was worthy of an award. There have been well over 2,300 rose varieties entered into the tests which have produced 72 winners, or a little over 3% of the roses tested.

Five years after AARS was originated, the All-America winners accounted for 10% of all roses sold. In 1967, All-America award winners comprised over 40% of all roses sold in the United States. This demonstrates the confidence that the general public has in the testing and introduction system.

A valuable by-product of the AARS program is the shipment annually to 130 AARS approved Public Rose Gardens of the newest All-America roses, donated by the introducers of the winning varieties. The plants are sent the season preceding catalog listing and may be seen during the blooming season in all of the gardens located throughout



Scarlet Knight — grandiflora.
AARS winner for 1968.

the United States. Not only does this assure such gardens of a constant source of the newest and finest roses, but the public has an opportunity to see the latest award winners under actual growing conditions in their own area before they are offered for sale. A plant tag bearing the AARS Certification Mark shall be used on all plants of AARS award winners.

AARS TEST GARDENS

There are 24 official AARS Test Gardens situated in 18 states scattered throughout the nation. The greater part of these test gardens are located at Universities or at the larger public rose gardens. Most of these test areas have been functioning for many years.

Test gardens are under the rigid supervision of the AARS Test Garden Committee. Specific instructions regarding the lay-out of the garden, planting, care, time and manner of judging, must be carried out to the letter.

Anyone may enter a new rose variety into AARS competition by paying the entry fee and furnishing test plants to each of the gardens. The roses may come from anywhere in the world. There are no restrictions to a rose entering competition except the variety may not have been available previously in the United States for outdoor planting.

Application for entry of a rose candidate to the trials must be made on an official AARS form. All entries are assigned a code number which will be their only identification throughout the trial period. Entries of rose candidates may be made in any or all of four authorized classes: (1) Tea and hybrid tea; (2) Floribunda and Polyantha; (3) Climbing or pillar and (4) Grandiflora.



Europeana — floribunda.
AARS winner for 1968.

REQUIREMENTS FOR TEST GARDENS

A test garden must have sufficient space available to set out 4 plants of all varieties entered for tests. These test plants are planted in the spring and must be maintained for 2 years. It is desirable to have enough land available so that after a group of roses is removed at the end of a 2 year test period, the land can lie fallow for 1 year for fumigation and rejuvenation before being planted to test roses again.

Soil must be well prepared for the roses, according to the needs of the locality. Soil samples must be sent for chemical soil analysis at least once a year to determine whether any modification of the soil is needed.

It is required that the roses receive good garden care for the area in which they are growing. This means good planting at the proper time and at distances usual to the particular location; regular spraying or dusting in accordance with good practice in the area,

keeping in mind that the primary aim is prevention rather than cure; feeding as required to assure adequate nutrition; reasonably clean culture regarding diseased foliage, weeds and removal of faded and spent blooms, normal pruning at proper time and irrigation as needed to supplement rainfall and to keep plants growing and in good condition.

JUDGING

AARS is just as strict with its judges as with its test gardens and will not allow its All-America awards committee to accept the score of any judge who has not served a two-year apprenticeship. All judges must turn in two complete sets of scores on each test rose each year for two consecutive years. A further requirement is that all official judges, many of whom have served for over 20 years, must attend a two-day Judges Seminar for a refresher on the art of judging once every five years.

Test roses are judged on the following:

1. *Novelty* — This score allows credit for some outstanding quality which makes it different from the roses already in commerce.
2. *Habit* — Good habit requires upright canes well distributed and well branched later in the season. Plant should not appear leggy and should be uniformly balanced.
3. *Vigor* — Vigor represents growth, good size for its apparent type and continued action throughout the season. Hardiness is a part of vigor, loss of vitality due to climate is a fault.
4. *Disease Resistance* — Represents susceptibility to leaf

spot, mildew, rust and other diseases as this affects the general health and bloom.

5. *Floriferousness* — Scored for quantity or abundant mass of bloom in proportionate size to the plant, also for continuous or repeated blooming.
6. *Stem* — The stem should have strength enough in proportion to properly support the bloom in an upright manner and above the new growth. Weak necks are a serious fault. Long stems suitable for cutting are an asset on hybrid tea entries. Grandifloras and floribundas are rated also on cluster arrangement of blooms.
7. *Foliage* — Pertains to the physical characteristics of the foliage. Should have sufficient size, good texture, good color and be decorative.
8. *Bud Form* — Judged when buds start to open.
9. *Flower Form* — Flowers should be well centered, petals should unfold evenly and retain pleasing character until the bloom has aged enough to fall.
10. *Substance* — This is thickness and firmness of the structure of petals that gives them form, stability and lasting quality. Texture and finish are also rated.
11. *Color* — Rated on opening and finishing color. Color should be clear, clean and attractive. Petal color when flowers finish should not be unpleasant.
12. *Fragrance* — An almost essential characteristic.

AARS TEST GARDEN AT DENVER BOTANIC GARDENS

Denver Botanic Gardens was established as an official AARS Test Garden in 1968. Prior to that time there had been no rose testing site in an eleven-state area which included New Mexico, Utah, Nevada, Idaho, Montana, Wyoming, North Dakota, South

Dakota, Nebraska, Kansas and Colorado.

Mr. G. E. "Casey" O'Donnell is the accredited test garden judge. He is a member of the Denver and Boulder Valley Rose Societies, Director of the Rocky Mountain District and a Judge Instructor of the American Rose Society and a nationally accredited Rose Show Judge.

B.M.P.



The Holly Society of America and the International Registration Authority for cultivated *Ilex* (holly) wish to announce a change in the place of the registration authority *from* the College of Agriculture and Environmental Science, Rutgers, the State University, New Brunswick, New Jersey with Dr. E. R. Orton, Jr. as registrar *to* the U.S. National Arboretum, Washington, D.C., 20002, with Mr. Gene K. Eisenbeiss as registrar.

All future national and international holly registrations and inquiries for information are to be sent to Mr. G. K. Eisenbeiss.



Exotics of Colorado—

Harison's Yellow Rose

DR. HELEN MARSH ZEINER

FEW EXOTICS of Colorado are regarded with such genuine affection as Harison's yellow rose, that old-fashioned shrub rose which has become a symbol of times long past and a living memorial to those women who brought the plant here and nurtured it so well.

This long-time favorite rose is described as having small, open, semi-double, fragrant bright yellow flowers; strong canes often 6 feet high, and spreading; and rich green foliage with small leaflets. It is said to be a very vigorous, enduring shrub with profuse nonrecurring bloom.

Harison's yellow is a very old rose,

first distributed commercially by the Prince Nursery, Flushing, New York, in 1830. It must have been an instant success, for it became extremely popular and its use spread rapidly, not only in this country, but also in other parts of the world.

The actual original of *Rosa harisonii* is in doubt. Some rosarians consider it to be a cross between *Rosa foetida* and *R. spinosissima*, while others say it is a cross between *R. spinosissima* and some unknown parent; still others feel that it is a chance seedling or sport of *R. spinosissima* and not a hybrid at all.

We may not know its ancestry with certainty, but we do know quite a bit about its early history.

It first appeared in the New York City garden of George Harison and his father, Richard Harison, both avid gardeners. Richard Harison died in 1829. How long before this the rose appeared in the Harison garden, we do not know, but is assumed that it had been growing there some time before it was made available commercially. Records indicate that the Harisons cultivated several varieties of *R. spinosissima* in their large garden, and it must have been involved in the ancestry of *Rosa harisonii* in one way or another.

The rose was named for George F. Harison, who was an attorney in New York City. Some accounts say that he was Reverend Mr. Harison, a rector of Trinity Church in New York City, but other accounts say that records of the church do not confirm this. Family records, however, indicate that George Harison was indeed an attorney, that his health was poor, and that he was forced to carry on only a limited law practice and to spend much time outdoors. Gardening was not only a hobby but a therapy for him.

George Harison may have first given the rose to Thomas Hogg, a New York nurseryman from whom William Prince of Prince Nursery obtained the rose. It is said that Thomas Hogg did not have the facilities to propagate and distribute the rose, but he did sell a few plants as Hogg's yellow.

Harison's yellow rose is described as being very hardy and resistant to neglect, and its history shows that this is unquestionably true. The progress of our settlers westward across the country is paralleled by the progress of this rose. As they moved, the rose

went with them, and there is hardly an old tumble-down farmhouse in all the midwest that doesn't have a Harison's yellow rose clinging tenaciously to life and blooming faithfully each spring.

Harison's yellow moved with the early settlers not only because it was a favorite rose, but also because it was an easy rose to propagate, putting up suckers which were easy to transport and establish in a new home.

As the settlers came farther west, they brought this old much-loved rose with them. In Colorado, the women planted Harison's yellow rose around their cabins in mining camps, their homestead shacks on the plains, or where ever they tried to make a home.

Today we can see very old yellow roses and their progeny in mining camps such as Central City and Georgetown. Look for Harison's yellow rose in the yards of kept-up homes and also in the yards of cabins long abandoned and gone to ruin; in the cemeteries;



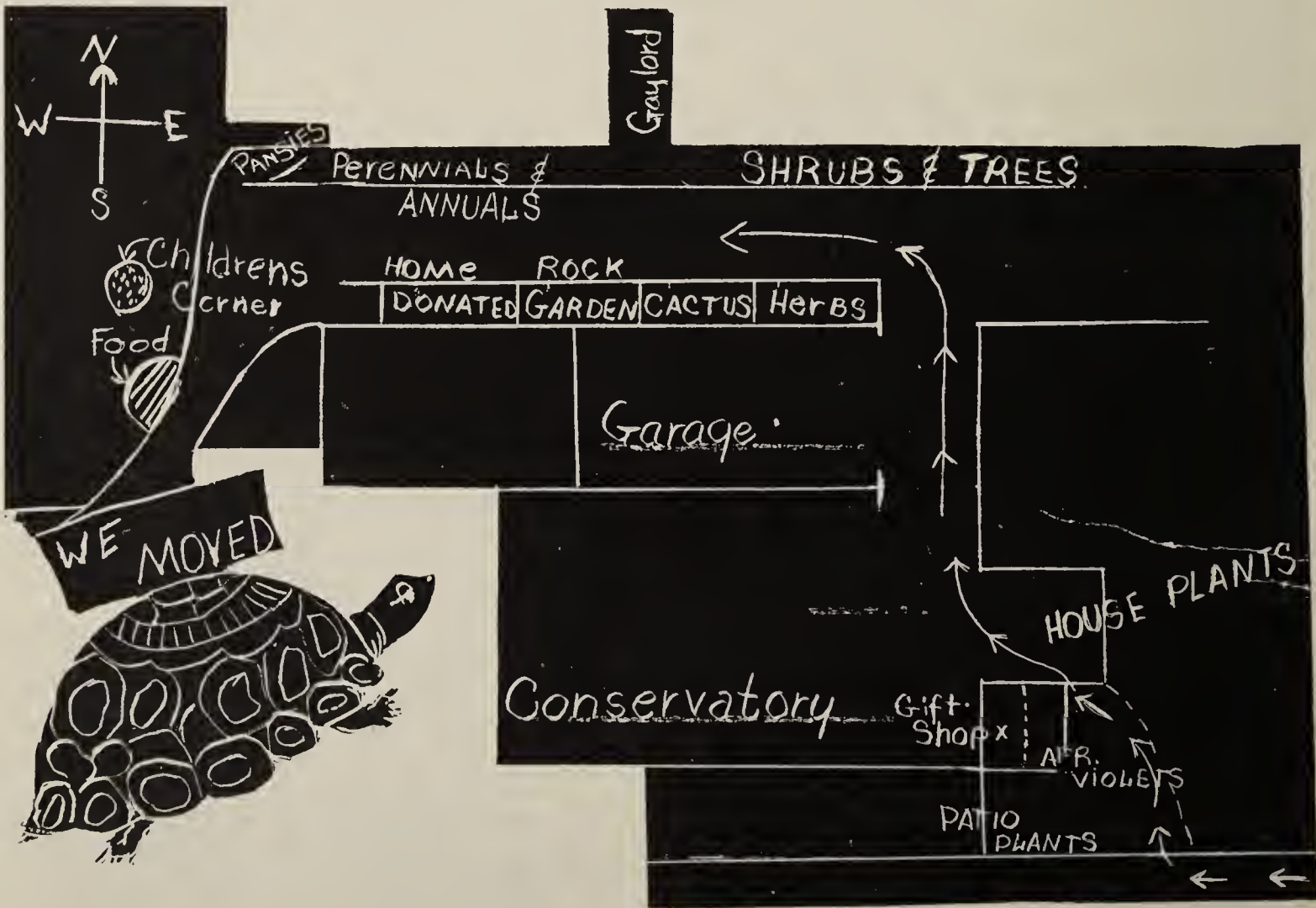
and in such places as the gardens of Central City Opera House. So popular was this rose — and so enduring — that it is almost a trademark of those by-gone days.

Harison's yellow rose has by no means outlived its usefulness. It makes a good addition to a shrub border and is useful as a background shrub. True, it blooms only once a year, but that wonderful profusion of fragrant yellow is worth the other months when the bush is only a thorny, non-descript rose.

Harison's yellow, which has proved so well that it can stand neglect, is a good choice for the garden where water is limited.

If you would like to read more about this interesting old rose, and particularly about its possible parentage, see *History of the Rose*, Roy Shepherd, available in the Helen Fowler Library at Denver Botanic Gardens.

AN ENTIRELY new approach to the Botanic Gardens Annual Plant Sale will take place literally on May 8 and 9. Of necessity, activities will be centered around the Conservatory complex with most of the sales booths clustered along the north parking area. Approaches will be possible through the Gaylord street gate off 11th Avenue and the Conservatory gate and entry on York. (Reconstruction of the Gardens in accordance with the Master Design makes much of the former sales area unusable.) On this map the Conservatory complex has been distorted in scale to indicate more clearly the location of each specialized booth.



The Wee Ones

C. LEE CAMPBELL —
ADDICTED ROSARIAN*

I'M HOOKED — how long? Three years or more now. I was only fourteen then — I didn't know.

I did not know how exciting the world of the rose could be. I don't think the wonders of Lady Rosa will ever cease to amaze me. Each and every bloom is a new source of wonderment — something new, something different.

Shortly after I discovered the world of roses, one particular class, miniature roses, was introduced to me by B. B. Williamson. The plants were ever so small, a Lilliputian delight. The blooms were even smaller, the smallest I had seen. I knew when I saw those perfect little plants, I was hooked — hooked on the miniature rose.

My addiction led me to order two "minies," Red Imp and Twinkles. Upon their arrival in the spring, they were carefully set out in the rock garden. However, with so little knowledge of their needs, I soon realized my first fatalities, Red Imp and Twinkles.

Without these precious little jewels, the garden seemed incomplete. There were larger roses, but they just couldn't take the place of my "minies." My loneliness was dispelled with the birthday gift of three new miniatures: Baby Gold Star, Tri-Color and an unnamed

one. Again, they were planted with care; this time they lived.

Success with these miniatures prompted me to send for my first miniature rose catalog. It listed 125 different cultivars of miniatures in nine different color groups, including about 20 miniature climbers.

Finally it was decided that I could order some miniatures for the following spring. The seasons passed and orders were placed with Mini-Roses of Dallas, Texas, and Moore Miniature Roses of Visalia, California.

Twenty-five plants had been ordered and all arrived by air mail in March. Each was individually packed in its own foil container with moist sphagnum moss protecting the roots from drying. Once again, they were all planted very carefully; all did well.

Spring weather in 1969 was none too good for newly planted roses; spring freezes continued a little longer than usual. Most rose plants showed definite injury, but not my hardy miniatures. They seem to withstand the punishment better than their larger cousins. What they lack in size is more than made up for by their hardiness and persistence.

A hailstorm hit the miniatures very hard. Like other plants they were mostly defoliated and their canes severely bruised and battered. When good weather returned, my miniature, Lavender Lace, was the first to bloom. Their vigor and strength seems un-

*Mr. Campbell is a junior member of the Arapahoe County Rose Society.

paralleled by any of the larger roses.

My short experience with these roses has led me to several generalizations: first, they do not like an excess or even a normal amount of fertilizer; second, they do not like *dry* feet.

When feeding miniature roses one must consider their diminutive size — I have found that even the recommended amount of most fertilizers is far too much for the little jewels.

As a general rule, I believe that half of the prescribed amount is safe. I don't think there is one best fertilizer. My choice is a fish emulsion fertilizer (5-2-2), used as a foliar feed early in the morning, not in the heat of the day. Its only drawback is the fish odor.

Miniatures seem more susceptible to iron chlorosis than larger roses. This seems reasonable as their root system is small. To counteract this, chelated iron seems the most effective additive. Iron sulfate, as an alternative, has a tendency to become locked in the soil and thus be unavailable to the plants.

The soil around miniatures must never dry out—once it does, the plants can die very quickly. Neither should it be waterlogged, only moist enough to support plants.

Miniature roses, like their larger counterparts, are likely to contract certain ills throughout the growing season. One major problem is their tendency to harbor those nasty little spider mites. And unless these ravagers are controlled, the miniatures tend to suffer severe defoliation, which is quite detrimental to any plant. Being a firm disbeliever in numerous sprays which further destroy the ecological balance, I merely wash the little plants with water and thereby alleviate the problem. So far this method has also been effective in the control of mildew.

Miniatures may occasionally fall prey to blackspot. By careful observa-

tion, this condition can be checked at its outset. I have found that the simplest and safest cure is removal and quick disposal of infected leaves.

Wintering miniatures is one of my easier gardening tasks. I suggest using any of the following methods here in Colorado. The "minies" can be covered with but not sealed in by large sheets of poly film or a lazier method is merely to place straw around each plant.

If really addicted to "minies," as I am, you should start cuttings during the summer to have rooted cuttings to bring in for the winter. Always trying to please their master, miniatures are content to grow in a can in the house. At present, the dining room window is host to 27 wee ones, last summer's cuttings. Their blooms are most appreciated.

Inevitably, I have developed preferences toward certain varieties. I think the finest new miniature I've grown is Lavender Lace. Other favorites are Trinket, Jeanne Williams, Scarlet Gem, Cinderella, Beauty Secret, Starina, Toy Clown, Tom Thumb, Gold Coin, June Time, Baby Darling, Border Flame, Chipper and the old Red Imp.

If you have only a small corner of yard left in grass, as I do, it is well worth while to plant a miniature rose garden and thereby eliminate the problem of having to mow the lawn.

You are invited to

ARS Rose Show

in the lobby of
Colorado National Bank
17th and Champa Streets

Saturday, June 20, 2 to 6 p.m.

Sunday, June 21, 10 a.m. to 5 p.m.

How Good is *My* Rose



G. E. "CASEY" O'DONNELL

OF COURSE *your* rose is very beautiful — because "Beauty is in the eye of the beholder." But, if you want to evaluate your back yard Princess by American Rose Society standards, here is your Rose Judging Bible.

A good rose is described by the American Rose Society as "a bloom having excellent form, size, brightness (clarity) of color, substance, good stem and foliage, and which at the time of judging is in the most perfect phase of its possible beauty. To identify the distinct qualities of a specimen bloom and to provide a standard for evaluating each of these qualities, a point scale has been devised:

Form	25 Points
Color	25 Points
Substance	20 Points
Stem & Foliage	20 Points
Size	10 Points

These five attributes which must be possessed by your rose for blue ribbon consideration are described below:

FORM — This is the shape or outward contour of the bloom. This shape must be symmetrical, and with most varieties is circular in outline. The

inner petals must be uniform in arrangement, sufficiently open to reveal a well formed center without flaw, but not open to a point where perfect symmetry and pleasing petal arrangement begin to deteriorate. This is a transient stage, usually occurring when the bloom is from one-half to two-thirds open; however, the essential rule is not the exact stage of bloom opening, but that the bloom is in the "most perfect phase of possible beauty."

Remember, a rose bud, no matter how beautiful, is not yet a bloom.

COLOR — No particular hue or shade is favored above another, since rose color covers a very wide spectrum, excepting a true blue. The color must be typical for the variety in the area where grown. Color must also be clear, not streaked or faded, fresh, brilliant in the sense of youthful freshness, and not be blemished by dust, spray residue or insect damage.

SUBSTANCE—This is the external evidence of internal well being. Substance is crispness, thickness, turgidity and toughness of the petals. Substance is the factor sustaining form, color

quality and keeping quality of the bloom. It is the foundation — the cornerstone — upon which other desirable qualities are constructed.

STEM AND FOLIAGE — These two items considered together in the scale of points complement the bloom and provide the basis for the regal, distinctive, overall appearance so essential in presenting or projecting an excellent bloom as a complete blue ribbon specimen. The stem should be sturdy, free from unpleasant curves, be of length in proportion to the bloom size, and display several five- to seven-leaflet leaves. The neck of the stem, that portion between the top leaf and the bloom, should not be so long as to appear awkward, nor should it be so short that the top leaf is right under the calyx. Since Hybrid Tea roses and some classes of Grandiflora roses are shown with but one bloom to a stem, disbudding, if necessary, must be done with care when side buds are very small so that awkward stubs or scars do not appear on the stem. Foliage (leaves) should be evenly spaced along the stem and should be typical in size for the variety. Leaves must be clean, healthy, free of dust or spray residue, and should show no evidence of weather or insect damage.

Foliage should be carefully groomed, but use of polishing agents is prohibited. Undersized foliage usually indicates lack of plant health and vigor, while oversized foliage is commonly caused by over-feeding.

SIZE — The bloom should be a full-sized, mature specimen, the typical product of a well-cultured plant of the variety. A very large bloom is not necessarily better than a small one, as long as the *small* bloom is in accord with the above criteria. There is no

penalty for a large bloom as such, provided it is not so disproportionate to the *balance* of the specimen, or gross in appearance.

There are numerous technical regulations governing the judging of Floribunda roses, miniatures, climbers, shrub roses, “old” roses. These differ in many respects from the preceding outline, detailing procedure for Hybrid Tea and single bloom Grandiflora judging, but the point scale and the general principles are constant.

Two important phrases, “typical of the variety” and “most perfect phase of possible beauty,” are dependent for proper interpretation on the experience and dedication of carefully trained American Rose Society Judges. An aspiring candidate for certification to this status must know intimately the characteristics of a minimum of 100 different varieties in their complete range of variability, be acquainted with at least six of the major rose types, have a knowledge of the history of successful rose growing and rose showing, attend a formal rose judging school, attain a passing grade in theory and actual judging practice under the supervision of a team of fully qualified judge-instructors, and finally, must serve an apprenticeship of two years judging under supervision.

In summary, a show rose is like a little girl all dressed up for her first party. A show rose is clean, fresh, well groomed, sparkling, and displays that indefinable efflorescence arising from excellent culture and careful attention to preparatory detail.

A show rose is your back yard Princess, competing for the title of Miss America — Queen of Show.

Ed. Note: Mr. O'Donnell is willing to answer any questions in greater detail.



Roses in the Landscape Plan

FRANCIS W. NOVITT

THE ROSE fancier who wants a collection of roses views the whole subject of roses in the landscape plan differently from the gardener who wants some roses, or the landscape designer who views the overall garden plan primarily, and works in roses where they will fit, using whatever type of rose is appropriate to the particular area in question.

Rose collections require rose beds, not too wide to maintain comfortably, large enough to look good, located with the proper exposure to sun, so as to be seen from the rose fancier's window or patio. Since they assume a good deal of importance, even when not in bloom or even in leaf, the rose beds sometimes

are rather elaborately designed. The rose garden often becomes rather formal, and with a certain amount of intricacy, with shapes of beds and surfaced paths which will have an effective design at all times of the year. It is even possible to include a small hedge plant around the rose beds, provided it is shallow-rooted, one which will not compete with the tea roses, and will grow more upright than spreading. The space for such a border plant might be divided from the rose bed by a redwood board or some other suitable material. The border plant should be something of sufficiently thick texture to cover the bare rose stems, and give a feeling of foliage during the dormant season.

Perhaps miniature roses would be a good border plant here. In one color only, they would tie together a number of beds of mixed colors of tea roses. They would look thin in the winter though, and perhaps would be best as border plants in the perennial garden, or grouped in front of other taller perennials, or planted in the rock garden.

A gardener who wants roses mainly for cutting would probably prefer them in a less conspicuous place. Tea roses do not have as profuse foliage as other shrubs, but can be mixed informally with them most effectively when grouped several of one color together.

Floribunda roses are much more adaptable. They lend themselves to the rose bed as well as to massing in the shrub or perennial border. They create spectacular results when just one color is used in a front yard, or a door yard garden, mixed with low evergreens, bordering a shrub planting, or alongside a walk. Many of the shorter grandifloras would do as well in these situations.

Bear in mind that the roses, as with other flowers, the fewer the colors, the greater the effect. Just one color, or perhaps two, with a lower plant bordering a taller one will always be the more effective, especially in a small

space. An art teacher once told me "When in doubt, simplify." It is a very good rule to remember when you are not sure about what to do. It applies not only to colors but to all parts of design.

Climbing roses, on a fence or trained on a trellis for screening an unwanted view or for privacy, would follow this rule too. Be sure they get the required hours of sunlight, or prepare to plant some other kind of a plant.

Shrub roses color the garden at times other than during their blooming period.

There are some with beautiful reddish leaves, others with large red hips which last well into winter. Shrub roses are also valuable as hedge material. A thorny rose is a very effective barrier. Some sucker badly, however, and should be planted where they won't become a perennial nuisance.

The Annual Terrace and Garden Tour Thursday, July 30, 1970

10 a.m. to 8 p.m.

Wine Tasting 5 to 7 p.m.

**A Denver Botanic Gardens Benefit
sponsored by
Botanic Gardens Guild**

**tickets - \$ 4.00
available at Denver Botanic Gardens**

OLD FASHIONED ROSES

TO KNOW AND ENJOY

JOAN FRANSON

THE AMERICAN Rose Society Motto is: A rose for every home, a bush for every garden. When most people think of "a rose," the first vision to float into focus is a full petaled Hybrid Tea bloom beginning to unfurl its silken petals — with color choice up to the viewer.

Gardeners usually plan rose space in their garden around the prima ballerinas — Hybrid Teas; taller growing beauties — Grandifloras; and steady performers — Floribundas. Perhaps a few experiment pleasantly with the wee imps — the Miniatures. Tucked along a fence or against a trellis is a lonely Climber or two to complete the picture.

As you know our Colorado weather will dictate what can be expected to do well. Why not consider these restrictions as an inspiration rather than a limitation. There are roses for nearly every situation in a garden — bank covers, fragrance, specimen plants, miniatures for borders, pillars and beds.

Since people are generally familiar with the rose types mentioned above, we won't discuss them. For a few minutes let's flip the coin and see what else the rose world offers by meeting a few types of roses which might be lumped into the unwieldy group called "old fashioned roses." So much cross breeding has been done that exact definitions of types are not possible. Also, later crosses can extend color range and may even modify plant habit of growth.

There are many "old fashioned roses" which do well in Colorado. Those types which repeat may tend to repeat more consistently after becom-

ing established. The date in parentheses is the year of introduction when known. All roses described have been grown in the metropolitan Denver area.

The Gallicas are considered a very early species rose and are quite hardy. They are ancestors to Centifolias, Mosses, Albas and Damascenas. The Gallicas were widely distributed in cultivation because they produce many easily propagated seeds, have wide tolerance in pH range and withstand drought and temperature changes. They usually grow moderately upright with solitary or few flowers to a stem. Colors are rich and brilliant, generally from rose red to deepest crimson and sometimes striped or variegated. They do bloom only once, but then so do lilacs and peonies which are prized by many.

Belle des Jardins (1872) — medium-sized blooms of purplish violet-red marbled carmine with some white. Bush is up to 2½ feet tall.

Camaieux (1830) — fully double bloom striped white on rosy purple. Fragrant. Blooms a lot. Bush is to 2½ feet.

Charles de Mills — mauve-purple and red, reverse more silvery. Big blooms, fully double and fragrant. Bush is 3 feet tall.

Rosa gallica versicolor (Rosa Mundi) (prior to 1581) — semi-double, white, pink and red in stripes. Up to 2½ feet tall.

Tuscany Superb (prior to 1848) — grows to 3 feet. Dark rich crimson with gold stamens adding to beauty. Fragrant.

Centifolias are sometimes called the cabbage roses because of their many in-curving petals. They can have 100 petals. These were great favorites of the Dutch painters and appear in many of their works of 1600 to 1800. Here are some to consider:

Blue Boy (1958) — interesting name, but needs more wood saved over winter than is usually possible here. Not recommended. Large double blooms of mauve red-violet.

De Meaux (1789)—no bigger than a nickel, these very double, fragrant blooms are in clusters. Known as the baby Centifolia. Pink and precious on a bush just 1½ feet tall.

Petite de Hollands — very double, small flowers in delicate pink. Blooms a lot and in clusters. Bush to 3½ feet.

Rosa centifolia bullata (before 1815) — grows to 4 feet. The foliage alone is worth growing this bush. The leaves are deeply crinkled and the newest ones come out like crumpled red leather as they begin to unfold. The flowers are the frosting — big, very double pink blooms having larger outer petals and many tiny inner petals.

Tour de Malakoff (1856)—blooms sparingly, large loose flowers in shades of mauve and purple. Perhaps more shelter would help.

Moss roses are delightful. They are a sport from the Centifolias and are called that because of the covering of elongated mossy glands on the stems and buds — soft and fragrant, the moss adds so much to the overall beauty of this rose. The partly opened bloom with the moss just disappearing at the edges of the outer petals is your private valentine.

Black Boy (1958) — interesting name, but not recommended for the area. Seems to need more protection. Blooms on old wood. Dark red, not very mossy, double flower.

Communis (Old Pink Moss) (1696) — one of the best. Double, fragrant pink blooms in clusters. Good substance to petals. Does not repeat but has a long blooming season. 5½ to 6 feet tall.

Crested Moss (1827) — up to 4 feet. This one is a must. The “moss” is a ferny growth only on the edges of the sepals and forms a sort of three cornered hat on the buds. Clear pink buds slowly uncrumple their petals and beauty is yours.

Deuil de Paul Fontaine (1873) — 2 to 3 feet. Moss is “soft” only as it first appears immediately under the bud. Soon turns stiff and prickly. All canes are densely armed with red to brown thorns. Blooms are deep crimson turning to black, purple or brownish red. Repeats. May mildew.

General Kleber (1856) — 2½ to 3 feet. Ferny moss very heavy on stems and buds. The petals are soft pink and have good form. Usually blooms three in a cluster.

Gracilis — one of the mossier. Medium pink, full, globular.

Madame Louis Leveque (1874) — 4 to 6 feet. Although the blooms are beautiful soft pink when they open, the bush seems to resent our cool springs and the blooms usually ball. It is very susceptible to mildew. Not recommended for this area. It has been suggested that if ⅓ to ½ of the buds are removed, the remainder may open properly.

Nuits de Young (1851) — to 2½ feet. One whiff of its perfume and you are filled with fragrance to your toes. Deepest black-maroon petals with golden stamens. Velvety. Twiggy but neat upright growth; it seldom needs pruning. Produces dark red hips prolifically.

Salet (1854)—bright rose-pink and it does repeat.

As from their name, Albas are white, blush and pink. The bushes have medium-sized, grey-green leaves and the flowers have a smooth sweet smell. Quite rare roses.

Felicite Parmentier (1834) — very double, delicate flesh pink blooms. Fragrant. Blooms well. Bush to 3 feet.

Maiden's Blush (Small Maiden's Blush) (1797) — very hardy and vigorous — up to 5 or 6 feet. Pale pink to blush, medium-sized double blooms.

Another group is the Damascenas or Damask roses. They are noted for their fragrance. They carry the gene for repeat blooming and in some conditions of climate and culture they repeat well. Except for the Tea roses from China which are evergreen and tend to bloom 2 months a year, the Damasks were the first repeat blooming type of roses. Their hybrids, the Portland roses, are very closely related and both will be listed here. The Portlands were called the first really good garden hybrid (for repeat blooming).

Jacques Cartier (1868) — fragrant pink flower that repeats well. It has longer petals than some and therefore more modern form.

Leda (Painted Damask) (before 1827) — white with petal tips "dipped" in red. Very fragrant, blooms a lot. Bush to 4 feet.

Mme. Hardy (1832) — truly a sight to remember. A classic in history. A ring of a few larger outer petals, then many small petals unfold to disclose a green button eye in the center which sometimes sports into a second bud. Open blooms are rather flat, very full petaled, medium-sized and three to a cluster.

Rose Du Roi (1812) — rich deep red petals, very velvety. Repeats very well all summer when established. Fragrant.

The Bourbon rose originated on the French Isle of Bourbon. They repeat bloom and are of fairly vigorous growth. The blooms appear singly or in small clusters.

La Reine Victoria (1872) — vigorous grower, clusters of large cupped rose-colored blooms. The petals look like translucent shells curving together.

Mme. Ernst Calvat (1888) — medium-sized fragrant pink blooms. Repeats well. Bush to 3½ feet.

Mme. Isaac Pereire (1880) — fragrant, enormous rose-madder blooms that bulge with rolled petals, opening saucer shaped. Up to 6 feet.

Mme. Pierre Oger (1874) — a sport of La Reine Victoria. Same form in a softer pink — looks like cupped shells with light shining through.

Variegata Di Bologna (1909) — a globular double flower of blush to white petals striped in dark crimson. Too bad it isn't named better. Repeats sparingly.

A very hardy rose with interesting wrinkled foliage is the Rugosa rose. They are tolerant of neglect, bloom all summer, set hips and the glossy, deeply veined foliage turns yellow in the fall. The fragrant blooms are in clusters like small nosegays. It might be suggested that to promote more bloom, prune off the faded flowers in June and after that allow the hips to set. Rugosa forms a rounded shrub and the stems are covered with all sizes of stiff prickles.

Blanc Double De Coubert (1892) — purest white semi-double blooms that sing with freshness. One by one each in the cluster opens fresh each morning and then fades the next day.

Grootendorst Supreme (1936) — clusters of small serrated deep red, double flowers. Prolific in blooms, repeats. 3½ to 4 feet.

Rosa rugosa rubra — prolific pink single bloom 4" across. Some repeating. Bush to 3 feet. Good red stems in winter.

Rose a Parfum de l'Hay (1901) — fragrant double pale carmine-red fading into purple blooms. Large flowers. Bush to 4 feet.

Ruskin (1928) — double high-centered blooms, brilliant red. 4 to 5 feet. When well watered the blooms cover the bush.

Therese Bugnet (1950) — up to 3 feet. Large double blooms of red into pink. Repeats.

A group of roses called Hybrid Musk was originated by an English rosarian, the Reverend Mr. Joseph Pemberton in the early 1900's. Although their direct link to the species Musk rose is slight, the name associated with this group will be retained in the future, no doubt. These fragrant flowering shrubs should be planted more. They are vigorous, disease resistant and repeat bloom all summer.

Belinda (1936) — blooms in large trusses of pink semi-double fragrant flowers. Shiny foliage completes the picture. Excellent 5 foot shrub that tends not to grow upright. Does well in shrub borders or slopes. Tolerant of drought and neglect.

Bishop Darlington (1926) — to 4 feet. The buds are a lovely coral but the flowers, semi-double, open pink and fade to cream or palest pink.

Buff Beauty (1939) — apricot-yellow fading through buff and gold to cream. Fully double, fluffy 2" blooms are arranged in clusters. The long canes are low-arching or sprawling. It needs room to grow sideways, but does not grow tall. Could be planted on a bank to hang down.

Rosaleen (1932)—small but double cerise blooms in big clusters. Blooms late into fall.

Will Scarlet (1948) — excellent blooming shrub, 4 to 5 feet, repeat well. Vivid red, semi-double blooms. Nice lacy foliage.

This next group of roses is species roses and miscellaneous shrub roses. They are all individuals and very interesting to know. Generally this group tends to be disease resistant.

Austrian Copper (*Rosa foetida bicolor*) — grows awkwardly to 6 feet or more, do not try to add grace by pruning or it will sulk and refuse to bloom. Brightest firey-copper with reverse gold, single roses burst into bloom along the arching canes in spring. Often it will sport pure yellow blooms, too.

Burr Rose (*Rosa roxburghii* or Chestnut Rose) (prior to 1814) — low bush with leaves resembling a locust (9 to 15 leaflets). The buds are covered with tiny spines and look like round burrs. When the burrs split open the larger pale pink outer petals unfold to many tightly packed smaller inner petals in a fresh medium pink. Two red thorns are at the base of each leaf. The bark peels and is shaggy.

Dortmund (1959) — large single blooms of red with a white eye. Flowers in clusters and has shiny foliage somewhat resembling holly. Tends to sprawl or climb. Repeats all summer. Tolerant of neglect. Perhaps to increase number of blooms, prune faded flowers in June and then allow the following flowers to set the pretty hips.

Golden Wings (1956)—large single golden-yellow blooms and when they drop their petals, a puff of golden stamens remains. Good upright growth and good in shrub border. 4 to 5 feet tall.

Green Rose (*Rosa chinensis viridiflora*) (1855) — an eccentric rose but fun. Instead of petals, the pretty slender buds open to show a swirl of green sepals. Needs protection but is nice to

ve in arrangements and boutonnières. Hon. Lady Lindsay (1938)—lovely double hybrid tea-like blooms in form, delicate pink. Repeats. 3 to 3½ feet. Marguerite Hilling (1959) — sport Nevada but smaller. Delicate single flowers in medium pink. Shrub 3 to ½ feet. Prolific blooming, some repeating and drought resistant.

Nevada (1927)—excellent 4" white blossoms that may blush pink as they age. One of the best. Fairly upright. Blooms better when watered well.

Rosa eglanteria (Sweet Brier Rose) (1551) — eglanteria roses have apple-scented foliage, reason enough for an excellent "show and tell" exhibit in your garden. When it rains heavily; when the foliage is brushed by rough winds; or even sometimes in the hot sun — delicious apple scent floats around. Single pink roses in small clusters open all along the stems. This one is nice to peg over. Red hips last all winter. Very hardy.

Rosa rubrifolia (prior to 1830) — prolific single pink star-like flowers. It can also be grown for its interesting foliage — greyish-maroon in the sun, more bluish-grey in the shade. It has lovely red hips which are outstanding in the winter. Very tolerant of drought.

Rosa setigera (Prairie Rose) (1810) — a very vigorous rose with long canes — can be trained as a climber. The single blooms open rose and fade to pale pink. It blooms in late June to early July.

Rosa soulineana (1896) — clusters of airy white single blooms. A climber perfect for a trellis or fence. Can have canes up to 10 feet long. Can do well in shade.

Tea roses originated in southwestern China and by nature, coming from a warm climate, they would like to stay evergreen and bloom 12 months a year. Their tissues respond more slowly to

temperature changes than even their progeny our Hybrid Teas. Therefore they are not as adapted to our area except for a very few individuals. They will not be suggested for growing here. As a group they have contributed much in hybridizing. Their graceful sometimes gently nodding blooms have added form and fragrance. Repeat flowering and clear colors to Hybrid Teas. Their foliage tends to be disease resistant.

Hybrid Perpetuals were in great popularity just before the turn of the century—before the Hybrid Teas were developed. But as the newer, more constantly blooming Hybrid Teas came into prominence, the Hybrid Perpetuals began to lose out. They do serve a good garden purpose and could be planted more. Usually they are huskier bushes and have a very heavy bloom period in June followed by a scattering of bloom during summer and possibly having a slightly heavier repeating in the fall. They can use twice the fertilizer and water of Hybrid Teas which may encourage repeat blooming.

American Beauty (1875)—globular buds, fully double crimson shaded carmine blooms. May fade in hot dry weather. 3½ feet tall. Repeats.

Arrillaga (1929)—enormous, double silvery-pink blooms. Repeats well.

Baroness Rothschild (1868) — big, very double, medium pink Hybrid Tea type blooms. High centered. Repeats. Up to 5 feet.

Ferdinand Pichard (1921) — upright growth to 5-6 feet. Excellent blooming, repeats. Small double red and white variegated floribunda-like blooms. Good drought resistant shrub and heat tolerant.

Frau Karl Druschki (1901)—probably the most famous white rose. It has such clear white petals and such classic form that it has been switched to and

from the Hybrid Tea class several times. A good bush will get quite tall, but may be pruned to preferred size. Usually repeats. Good foliage.

General Jacqueminot (called General Jack) (1853)—fragrant, velvety-red double blooms. Some other reds are better in form. Repeats.

George Arends (1910) — this cross between Frau Karl Druschki and La France (the first Hybrid Tea) lives up to the family name. Pale pink blooms, very double, fragrant, beautiful.

Heinrich Munch (1911) — large, lush soft pink blooms. Repeats.

Henry Nevard (1924) — shorter growth, more like a Hybrid Tea. Dark red, fully double blooms.

Marchioness of Londonderry (1893) — perfect Hybrid Tea bloom. Looks a little like a pale Peace — delicate coloring, cream tinged pink with a lavender cast. Color varies with the weather. Up to 3 feet. After established, it will repeat in the fall.

Mrs. John Laing (1887) — lovely bloom of medium pink — cup shaped. Fully double. Repeats well. Up to 3 feet.

Paul Neyron (1869) — very large neyron pink roses. Bloom can be 6" across and is borne stiffly on straight stems. Always seems to keep a baby's fist of pink petals tightly closed over the stamens until the very last. Good old rose fragrance. Tends to send along canes upright and the flowers are so heavy that at times they could use staking. Excellent. Doesn't take much room.

Prince Camille da Rohan (1861) — deep velvety red. Double, fragrant, beautiful.

Reine des Violettes (1860)—rather flat blooms of lilac mauve tinged maroon in the depths.

Roger Lambelin (1890) — here is a rose with serrated petal tips edged

in white on a deep crimson-red bloom. Most unusual. Repeats.

I hope you will be tempted to try a few "old fashioned" roses. Tuck a few away in an empty corner and prepare for a different type of delight. But watch yourself, guard against the winsome ways or you might be led down a garden path to pleasure, knowledge or romance.

HYBRID TEAS

Champagne	Peace
Chicago Peace	Pink Favorite
Crimson Glory	Pink Peace
Eclipse	Prima Ballerina
Granada	Royal Highness
King's Ransom	Show Girl
Mohave	Sutter's Gold
Mr. Lincoln	Tiffany
Oklahoma	Tropicana
Pascali	

MINIATURES

Baby Darling	Red Imp
Baby Ophelia	Starina
Beauty Secret	Tinkerbelle
Cinderella	Tiny Flame
Dwarfking	Toy Clown
Jet Trail	Yellow Doll
Pixie Rose	

FLORIBUNDAS

Angel Face	Little Darling
Betty Prior	Red Pinocchio
Europeana	Roman Holiday
Fashion	Sarabanda
Fire King	Saratoga
Ivory Fashion	Vogue

GRANDIFLORAS

Buccaneer	Pink Parfet
Camelot	Queen Elizabeth
Carrousel	Scarlet Knight
John S. Armstrong	

*Mrs. Franson credits Suzanne Ash and B. B. Williamson for their recommendations, descriptions and assistance in the preparation of this article.

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NATIVE ROSES OF



DR. HELEN MARSH ZEINER

THE GENUS *Rosa* is a very large and difficult genus whose taxonomy needs further study.

Colorado has five native species of *Rosa*, according to H. D. Harrington's *Manual of the Plants of Colorado*. These are:

Rosa acicularis Lindl., a species widely distributed in Canada and northern United States. It occurs throughout most of Colorado at elevations of 500 to 10,000 feet.

Rosa arkansana Porter, the common rose of the plains and foothills at elevations of 3,500 to 9,000 feet. It is widely distributed in the western United States and western Canada.

Rosa engelmanni S. Wats., common in west-central Colorado at elevations of 8,000 to 10,000 feet. Its range is from Montana to Colorado.

Rosa nutkana Presl., scattered over Colorado at elevations of 3,500 to 10,000 feet. This rose is widely distributed through western United States and western Canada.

Rosa woodsii Lindl. found throughout Colorado at elevations of 3,500 to 10,000 feet, and very common in the mountains. It is widely distributed in the western United States and western Canada.

Early Colorado taxonomists (Coulter and Nelson, Rydberg, for example) listed many more species than Harrington's five. The classification of *Rosa* given by Harrington is, in part, a lumping together of several species into

a single species. It is now generally considered that, while variations do occur, they are not of great enough magnitude to warrant species status. Therefore, several species are lumped together as one species or complex. Taxonomists agree, however, that much more study of the genus is needed.

The situation is complicated by the fact that the species tend to hybridize, making wild roses difficult to classify and to key. Clumping "species" into complexes does facilitate identification and study of this difficult genus.

Wild roses resemble each other rather closely and are difficult to key because we do not always have all the necessary information, even in the field. Key characteristics include presence or absence of prickles on stems, and their distribution if present; height of stem; arrangement of flowers (singly or in clusters, on terminal or lateral shoots); size of petals; size of sepals. It is also helpful to know the appearance of the fruit.

Most of the roses native to Colorado have been cultivated as species roses, and some have been used in hybridization experiments.

As taxonomists develop improved methods for recognizing and proving plant relationships, this confusing genus will undoubtedly undergo change. It would be interesting if we could look ahead 50 years to see how the classification of the native roses of Colorado would compare with that used today.



FOCUS

on

Eriobotrya japonica

In the
Boettcher Memorial Conservatory
PEG HAYWARD

Rosaceae, rose family, is a large diverse plant family containing more than a hundred genera and three thousand or more species of trees, shrubs, vines and herbaceous plants. Many of its members are cultivated for ornament. Comparatively few are exploited commercially.

The genus *Eriobotrya* has about 30 species, all natives of the warmer parts

of Asia. *Eriobotrya* comes from Greek words meaning "wool" and "cluster" referring to the flowers. *E. japonica*, loquat, is the only one of considerable significance. It is native to China and Japan and is widely cultivated in warm temperate climates for its edible fruit and as an ornamental.

The loquat is a symmetrical evergreen which attains a height of 25 feet

and has a fairly dense crown. Its large decorative, stiff leaves, 8 to 12 inches in length, are narrowed at both ends and have sharply dentate margins. They are glossy green on the upper surfaces and whitish to rusty-tomentose beneath. The bark of the smaller branches is also covered with wooly tomentum. The leaves have conspicuous parallel veins running from the midrib to the marginal teeth.

Sweet-scented dingy-white flowers are born in terminal panicles and are partly hidden among the wooly hairs. The flower consists of the calyx tube with 5 apical lobes; corolla having 5 petals; 20 stamens; ovary concealed in calyx tube, and 2-5 styles. By late winter the first flowers have developed yellow or orange, plum-size, pear-shaped or globose fruits; they continue to mature into spring and summer. The fruits called pomes show remains of

the calyx at one end. The fruit is firm-fleshed and juicy and is considered a delicacy. When completely ripe it is eaten raw or baked and when partially ripe is utilized in the making of jellies and preserves. The seeds, usually two or three to the fruit, are large, smooth, and brown.

The loquat is grown as an ornamental or garden tree, and being quite hardy, is found throughout Florida and California. It thrives on numerous soil types, provided good drainage exists. Propagation is by seeds, budding and marcottage, but grafting is the preferred method.

Foliage of the loquat is a favorite among flower arrangers. The small branches are used either with or without flowers or fruits and the individual attractive leaves may be used fresh or dried.

THE DENVER Botanic Gardens Annual Plant Sale May 8 and 9 has ballooned into a gigantic event, beneficial both educationally and financially.

Here thousands of plants ranging in price from dimes to dollars are sold by some 300 volunteers who specialize in the culture of their carefully chosen favorites. During this two-day sale the public can select the distinctive, the unusual or the best of the ordinary from the largest collection of outdoor and indoor plants assembled at one location.

Heavenly scented geraniums will find customers scurrying to the Herb booth. Fragrant-leafed geraniums will include: *Pelargonium clorinda*, *P. quercifolium* (staghorn oak); *P. fragrans*, catmint; *P. torento*, ginger; *P. graveolens*, rose; *P. 'crowfoot'*; *P. tomentosa*, peppermint; *P. 'snowflake'*, rose;

P. 'Mrs. Kingsley'; *P. 'Dr. Livingston'*, rose; *P. 'mint rose.'* All are in limited supply. Tomatoes, cherry and pear tomatoes, thymes, basil and other basic culinary herbs will be sold here.

The Cactus booth, a delight to serious and novice collectors, offers many hardy species new this year and attractive for their immense flowers, their colorful and interesting stems, pads, spines or fruit, their unusual habit of growth or their rarity. Among the chollas (choyas) are *Cylindropuntia whipplei*, chartreuse flowers; *C-O. ochroleucus*, rare, yellow-white flowers; *C-O. leptocaulis*, Desert Christmas Cactus, petite fragrant blossoms sometimes in clusters with red or yellow holiday fruits; *C-O. kleiniae*, purplish blossoms. Flat-padded cacti include *Opuntia gosseliniana* v. Santa Rita, purple pad with large lemon-yellow flowers; *O. rutila*, Triangle cactus, ex-

quisite pink flowers; *O. polyacantha*, colors blend from deep maroon to red, pink and some petals are tipped or edged white; *O. juniperina*, Cliff Prickly Pear, huge lemon-yellow blossoms, large stems turn deep purple when dormant. Be there early!!

Newcomers to the Perennial booth are two successful daisies, Cobham's Gold with 3-inch creamy-gold double flowers on 15-inch stems and Little Princess with large single white flowers on foot-tall stems. Both form showy, compact clumps with flowers good for cutting. An all-time favorite is hardy Aster Frikarti, outstanding for its profusion of lavender-blue blossoms with bright yellow centers which give color in the garden for many weeks. Experienced perennial gardeners are happy to suggest the right plant for a particular situation. *Delphinium*, lu-

pine, peonies, *Hosta*, *Penstemon* and *Chrysanthemums* are a few of the trusty standbys.

Helianthemum (sun-rose) is giving star-billing in the Rock Garden and Ground Cover section. This little shrublet boasts deep green foliage that remains all winter and bright single rose-like flowers. It is sold by color — apricot, pink, yellow, white or rose — likes a sunny position and will adapt to rich soil or poor. Plants for sun or shade, moist conditions or dry, choice jewels for favorable settings and robust species for problem areas can be found here. Kinnikinnick, pussytoes and a little perennial *Potentilla* are some of the native plants available.

The Gift Shop will stage a miniature fiesta with gay Mexican patio accessories: sunburst clay plaques, mushroom rooms, tree-of-life in sun motif and a 32-inch candlestick tree-of-life in spring motif, doves, birds, even a carousel in brilliant colors, bamboo bird cages and multi-colored candlesticks. Other fun gifts are hanging baskets and hand-thrown ceramic love jugs for small candles, weeds or incense. Treasured items for Mother's Day giving are exquisite pressed-flower pictures framed in shadow-boxes, the newest silk-flower arrangements, delightful boxes in various shapes made of clear glass with brass feet and frames for delicate figurines, jewels or candy.

Patio plants with suitable containers will be near the entry to the Conservatory. Indoors, members of the African Violet Society take pride in donating and selling an unusual collection of named violets especially appropriate for Mother's Day giving.

Bottle gardens and material for gardens-in-a-bottle (plants, soil and know-how) will be featured at the House Plant booth. Exotic or hard-to-

MAY 8 & 9



and plants will be offered to complement a favorite planter or delight a greenhouse enthusiast.

Bargains galore are always in store for customers at the Donated Plant booth. Generous gardeners share their plants and their knowledge with beginning gardeners or experienced plant hobbyists. Demand for these plants usually exceeds the supply, so shop early.

New or tried-and-true, the best annuals for this area are selected for sale. Petunias — singles, doubles, fringed or frilled — are offered in a complete color range. Pansies, snapdragons, marigolds and *Verbenas* as well as *Lobelia* and *Ageratum* are a few of the popular bedding and edging plants regularly available at the Annuals booth.

COME, GROW WITH US.

A Fertilizing Program for Roses

DR. WARREN KIRKLEY

KNOWLEDGE OF soil constituents and basic needs of a rose plant will lead to a logical and successful fertilization program for roses. The use of specific programs (if the soil needs nitrogen, fertilize with nitrogen, or whatever nutrient) is preferable to shotgun fertilization programs, the use of all-in-one fertilizers. The following facts, I feel, are most pertinent regarding fertilization of roses.

The genus *Rosa*, truly a remarkable plant, will survive under a wide variety of climatic and soil conditions; however, it will perform at its best, especially those somewhat fickle hybrid teas, only with carefully controlled feeding programs.

The time to feed a rose is when it needs to be fed. Ordinarily, the heaviest feeding is given early in spring when the plant demands for rapid growth are heaviest; thereafter only as necessary to keep a sufficient supply of nutrients which will vary to soil and water conditions.

What to feed a rose should be predicated on what a rose is hungry for and

needs. If soil is deficient in nitrogen, then feed nitrogen. Intermittent soil testing is recommended to determine availability of the different elements in the soil to guide you in your program: Soil samples may be sent to the Soils Laboratory at Colorado State University, Fort Collins, for testing, or you will find many home soil testing kits are easy to use and sufficiently accurate for this purpose.

Fertilizers are divided into two types, organic and inorganic. *Organic fertilizers*, which are complex chemical substances, usually break down slowly and avail to the soil smaller percentage amounts of the essential elements; however, they have the great advantage of generally breaking completely down to essential elements, carbon dioxide and water and all non-toxic substances. *Inorganic fertilizers* are simple chemical compounds which rapidly break down into larger percentage amounts of available nutrients. Portions of these chemicals may recombine with substances in the soil to form compounds called salts which may be toxic to the

plants and thus must be used carefully. Most commercial fertilizers are of this type. A rose garden fed heavily for several years with this type fertilizer and which shows gradual decline of plant vigor must be suspected of soil toxicity.

The major soil nutrients and amendments needed for rose development are nitrogen, potassium (potash), phosphorus, organic matter and pH. Each is considered separately.

pH is a measurement of the acidity or alkalinity of the soil with 7.0 considered neutral. Figures higher than 7.0 are alkaline and less, acid. Roses perform best in a neutral soil (6.2 - 7.0) probably because most minor soil elements (iron, magnesium, boron, manganese, etc.) are quite soluble and most available to the plant in a pH range of 6.5 to 7.5. This is especially true of iron, which is highly insoluble in alkaline soil. Often, chlorosis in roses, though due to iron deficiency, is really only improper soil pH. Most soil in Colorado is rich in minor elements and frequently only needs pH adjustment to make them available to plants, minor elements rarely need to be added here.

Sulfur or aluminum sulfate are most commonly used as acidifying agents to decrease soil pH. Sulfur applied 2.4 pounds per 100 square feet of soil will lower the pH approximately one point (7.0 to 6.0) to a soil depth of 8 inches (clay to loam soil). Attempts to change soil pH should be made a little at a time, check results as you go and stop when the desired pH range is reached. Soil pH should be checked frequently as commercial fertilizers, even water supplies, may cause normal change which will need correction. Most soils in this area are alkaline and contain ample calcium making the addition of

calcium fertilizers in such form as limestone unnecessary.

Nitrogen, an element found in proteins, is obviously needed for production of all proteins forming the cells of a rose bush. With an increasing supply of nitrogen the cells of a rose bush become larger, walls are thinner and retain a higher percentage of water (become succulent). With excessive nitrogen, cell walls become too thin, and lose resistance to attack by disease processes; canes are weak and subject to wind breakage; flowering and maturity are delayed. Increasing the supply of nitrogen increases the ratio of leaves to roots which is desirable to a certain point, because as the number of leaves are increased the area of photosynthesis is increased with increased production of carbohydrates. The more carbohydrates stored, the greater is winter hardiness.

If, however, excess nitrogen is used, the ratio of leaves to roots becomes too great, much of our short growing season is spent in producing new leaves, winter hardiness diminishes. Plants are excessively large, spindly and bloom poorly.

Small plants with small light green leaves often indicate nitrogen deficiency. In severe cases the leaves may be a uniform yellow and sometimes the lower, older leaves yellow and die prematurely. (This may be confused with red spider damage.)

All sources of nitrogen are highly soluble and pass readily into all types of soil. Those containing clay or large amounts of humus tend to hold these soluble forms of nitrogen over a longer period keeping it available for plant use. Nitrogen is readily leached out of sandy soils making frequent application necessary. Plants can use nitrogen either in nitrate form (most readily) or ammonium form and most commer-

cial fertilizers are either nitrate salts or ammonium salts. Organic forms of nitrogen are changed by bacterial action into ammonium.

Inorganic sources of nitrogen are acid forming ammonium sulfate with 20.5 per cent available nitrogen. Its use may result in the formation of large amounts of secondary salts. The use of sodium nitrate (Chile saltpeter), with 16 per cent nitrogen, has an alkalinizing action and its continued use may make clay soils excessively gummy.

Organic sources of nitrogen include manure (sheep, cow, horse, chicken) bloodmeal, hoof and horn meal, alfalfa meal and urea. These substances, with varying amounts of nitrogen, are broken down slowly by bacterial action. The nitrogen is not as rapidly available to the plant but is available for a longer period of time. Since the amount of soluble nitrogen is not high at any one time its loss by heavy irrigation, rains or simply by having sandy soil is less likely. Organic materials break down completely, generally without toxic salt formation. Urea is an ideal synthetic organic compound, it contains 45 per cent available nitrogen and is the least expensive source.

Phosphorus is essential for normal protoplasm development and for use in enzyme systems within the plant. Plants grown in phosphorus rich soils will have good root development, sturdy stems, and early maturity with good flower production. In phosphorus deficient soils plants show stunted growth, maturity is delayed and flower production is poor. Also, leaves may be purplish at the margins. Low in solubility, phosphorus is most soluble in nearly neutral soils. Highly acid or alkaline soils are usually phosphorus deficient. Surface applications are not adequate since phosphorus does not leach down; its sources are best worked

deeply into the soil when developing a new rose bed. Phosphorus is absorbed into plants in the form of phosphoric acid. Commercial fertilizers list the amount of available phosphoric acid on the analysis and not available phosphorus. Organic fertilizers are low in phosphorus and, if used, some mineral source of phosphorus should be added. Double or triple superphosphate, made by treating rock phosphate with sulfuric acid, is the best source of phosphorus because it contains 43 to 49 per cent available phosphoric acid, is neither acid or basic itself, and is of much greater solubility than rock phosphate which is practically insoluble in most soils in this area.

Potassium is essential for living processes to take place within plants. Potassium deficiency may be the cause of stunted plants, weak canes, scorched leaves with brown edges breaking off. Potassium deficiency will worsen iron deficiency. Iron chlorotic plants which don't respond to iron amendments may need additional potassium as well. Mildew often attacks potassium-deficient plants especially in high nitrogen soil. On the other hand, excessive amounts of potassium will reduce the plant intake of calcium and magnesium. Analysis of potassium is expressed as water soluble potash (potassium oxide) and not as potassium alone, regardless of the form in which it exists. Organic fertilizers, relatively low in potassium, may need an occasional boost with inorganic potassium, if used predominately in gardens. The best organic sources of potassium in this area are blood meal, 1 per cent; cow manure, 1.5 per cent; horse manure, 2 per cent and sheep manure, 3 per cent. Inorganic potassium chloride (muriate of potash) contains 48 to 62 per available potash while potassium sulfate contains

48 to 52 per cent. Most sources of potash are readily soluble and pass easily from surface application to the root zone. Since it is readily bound to clay and clay soils it is not leached readily from our soils. Be careful not to overdose, it is difficult to get rid of.

Organic matter is classified as living, that is, plants, micro-organisms, and animal such as earthworms; and dead, which includes those that decompose rapidly, are high in protein (nitrogen) such as blood meal, fish meal, cottonseed meal, and those that decompose slowly, low in protein and high in carbohydrate as sawdust, and straw.

Partially decomposed unstable organic matter contains soluble plant nutrients. Further decomposition may occur rapidly as with manure, moderately as with compost and leaf mold or slowly as with peat. Humus, a stable form of organic matter decomposes very slowly.

Incorporation of organic matter promotes granular structures and pore space. It allows feeder roots to penetrate heavy clay, reduces baking and crusting, which is injurious to surface roots, increases absorption of water into soil and allows air to enter the soil. It also increases the water holding capacity of soil. Organic matter used as mulches moderates soil temperatures in summer, reduces evaporation and weed growth. Humus acts as a buffer to maintain a stable pH, helps retain soluble plant nutrients in the soil and furnishes a medium for growth of micro-organisms, which may supply

certain growth promoting substances. With decomposition organic matter itself supplies necessary nutrients and micro-nutrients.

Organic matter contains carbohydrates and protein. Sugar, starch and cellulose furnish energy material for soil organisms and stimulates production of them while nitrogen-containing compounds supply the organisms nitrogen necessary for their growth. If during decomposition of organic matter, a concentrated amount of carbohydrate is released to the soil, incidence of soil organisms balloons. The population *requires* nitrogen for growth. This nitrogen is stolen from the soil and not available from the organic matter resulting in nitrogen-starved roses.

Organic matter can be composted *before* application or transformed to usable material if already applied. Well-fed roses are the rule if supplemental forms of nitrogen fertilizer are added to the soil when high carbohydrate forms of organic matter (sawdust, wood chips, straw, hay, manures) have been used. Composting organic matter simply allows initial decomposition process to take place outside the soil while adding the necessary nitrogen supplement to it.

Soil organisms increase while using both organic matter and available soil phosphorous may soon lead to serious phosphate deficiency in roses. Thus, most organic materials should be reinforced with phosphorus as well as with nitrogen.

COMPOSTING FORMULAS					
Material (bushel)	Nitrogen (cups)			Phosphorus (cups)	
	Ammonium Sulfate	Urea	Blood Meal Fish Meal	Rock Phosphate	Triple Super-Phosphate
Leaves and straw	1	1/2	4	1/2	1/4
Wood (sawdust-chips)	2	1	8	1/2	1/4
Manure (undiluted)	1/2	1/4	2	1/2	1/4
Manure (mixed with straw or hay)	1/2 - 1	1/4 - 1/2	2 - 4	1/2	1/4

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A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden center around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

SUMMER 1970



THE COVER

Strophanthus gratus Apocynaceae
Boettcher Memorial Conservatory

THE GREEN THUMB

VOL. TWENTY-SEVEN, NUMBER THREE

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The Green Thumb

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DAVID A. BLADES, *Editor*

SUMMER 1970

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A Garden of PERENNIALS

EVELYN F. JOHNSON

I STARTED my gardening experience with annuals, as most people do. I was six years old when I planted my first garden. It was a plot of ground about twelve feet square near the well where I filled my watering can to sprinkle my plants.

The first things I planted were Four O'clock seeds and having a practical streak I added a row or two of string beans. How those seeds ever came up I don't know for I dug here and there every day to see if they were sprouting. A reasonable number made it and thrived with the help of the sprinkling can. When the Four O'clocks began to bloom I checked them every day to see if they opened promptly at four o'clock.

Later I planted beds of marigolds edged with either white or purple annual alyssum. Then followed sweet peas planted along a 40-foot fence between our lawn and vegetable garden. What a chore it was to keep the blossoms picked to prevent the formation of seeds and the quick end of the blossoms.

There came dahlias with bushels of tubers to carry to the basement in the fall and out again the following spring. Next were the petunias beginning with a variety called "Rosy Morn." New and gorgeous forms and colors were added each year.

Iris became the rage and I couldn't

resist collecting all the varieties and they did make June a beautiful month. They were comparatively trouble-free until division time brought a surplus of plants that became a source of embarrassment since I could find no place for them and no true gardener likes to destroy any of his plants. Then my interest turned to the new English Chrysanthemums which came to us from England through the gardens of British Columbia. The garden space was soon filled to overflowing by the separation and replanting of all the progeny from each parent plant. There was also a great concern about the date of the first killing frost which would ruin the handsome display of blossoms.

I enjoyed all the annuals and tuberous plants that I had grown but I began to realize that for much of the summer there were few or no flowers in the garden. The annuals took half the summer to grow from seed to flowering size. Dahlias bloomed only in midsummer and into the fall and were blighted by the lightest frost and it was September before the chrysanthemums came into bloom.

I began thinking about how to have something of interest showing in the garden every month of the year.

I read books by some of the great ladies of gardening — those by Gertrude Jekyll, V. Sackville West, Mrs.

Francis King, and Louise Beebe Wilder. I also read books by the men who explored the mountains of Asia and South America for new plants for our gardens. There were several like David Fairchild, "Chinese" Wilson, Reginald Farrer who brought many of our finest garden plants home with them and then settled down to gardening and writing to teach us how to grow them.

From these people I learned that perhaps the best way to build a permanent garden having interest at all seasons is to use the hardy, long-lived plants.

These plants which endure in the garden over the years come to seem like old friends and like Reginald Farrer we might think of them as people. In his writing he always said, when giving planting directions, put *him* in a sunny spot or *she* likes shade.

January, the first month of the year and December the last, share the same plant, the Christmas Rose or Hellebore. These make pretty clumps of evergreen foliage that begin to set flower buds in November. These may open for Christmas if there is a spell of sunny weather but the buds continue to open from then on through February and March. By then they will be joined by the early species crocus, snowdrops, small species daffodils, and tulips. These varieties of dwarf bulbs are truly perennial in that they endure for years and multiply remarkably well.

One of the most delightful and welcome of these bulbs is the winter aconite or *Eranthus*; they begin to show their bright yellow blossoms above nice mats of green leaves in late February and into March and April. They multiply and scatter colonies among the Christmas Roses along with little white and purple wild violets. *Scilla siberica* is another favorite of these months with their blue-violet flowers.

April brings the purple Lenten Roses accompanied by other species bulbs such as the little tulips and daffodils. These, too, are permanent fixtures in the garden. The little tulips are red and striped (Peppermint) or mixed red and carmine. Many of the small daffodils are bunch-flowered. Silver Chimes is a favorite with four or five fragrant flowers on each stem.



Christmas Rose

In April and May many of the old spring favorites burst into bloom overnight — Basket of Gold, Creeping Phlox, the lavender *Aubrietia*, big blue and purple violets and a blue and gray variety that is called the Confederate Violet which came to us from the south where it grows wild.

Some of the taller spring bloomers are the *Centaurea montana*, the perennial Bachelor Button; the Doronicums, the first daisy-like flower to come at

this time — *Euphorbia polychroma* is another favorite. These can be planted among clumps of the big colorful Hybrid tulips and daffodils.

The great flood of color comes in the perennial garden beginning in late May and continues through June and July. June is the month dominated by Oriental Poppies, Iris and Peonies. The new Oriental poppies come in many colors, not just the old-fashioned orange shade. There are also double forms, Salmon pinks, Watermelon pinks, deep reds, bronze reds, pure whites and whites edged with orange or red. There are double orange or red forms too.

The old huge double peonies are red, white or pink but the newer single Japanese peonies that are in many colors are very striking. The Fern-leaf peony, a species variety is unusual. It has fine fern-leaf foliage and its shining single red blossoms cover the bush in mid-May about two weeks ahead of all the others.

Of course, Iris can be obtained in almost any size and color from the little dwarf Iris to the German Iris. They come in dozens of varieties. In July the Siberian Iris appears in both purple (Caesar's Brother) and white.

The stately Pacific Delphinium Hybrids come late in June with the purple, white and blue shades and now even the new pink colors are available.

Another spire is the Tritoma which continues for weeks. There is the Coral Sea — a red and sunset yellow tipped with red. The pure white ones and pure yellows have not proven hardy here. Lythrum, with its pink or purple spires, blooms for weeks.

The new Shasta daisies add much to the garden picture. The new super giants from various European hybridizers have large flowers on strong stems.



Delphinium

Red or pink painted daisies or Pyrethrum add much in June.

The *Campanula* family has forms for many situations. There are tall, medium and short ones. The peachbells with large blue and sometimes white bells are popular. The small spreading kinds with dainty foliage like *C. carpatica* are liked for rock gardens and edging. The Scotch Bluebells with grassy foliage and tiny bluebells clumps about a foot tall and blooms for weeks.

The Dianthus or pinks come in many forms. There are low spreaders like *D. deltoides* or medium-tall plants with lovely fragrant flowers. The Alpine pinks make neat mounds covered with their pink or red blossoms.

August and September bring the richer colored flowers — the sunflower family includes the *Heliopsis*, the orange sunflower. One is called "Light of Loddon" and a person can understand *why* on a cloudy day. The Helianthums, Gaillardias and the tall Goldenrod — "Golden Wings" are bright and colorful. The new dwarf Goldenrods seem to be worth trying.

Rudbeckias are found in August; one is called The King, it is maroon-red with a cone-shaped orange-brown center. The seed pods are especially attractive and dry well for use in arrangements.

Helianthus, the double sunflower looks like a small dahlia. It grows with little care.

Plumbago or Leadwort is unusual and is an interesting fall bloomer. It is a blue foil for all the bright autumn things. *Tradescantia* Purple Dome is another blue flower for summer and fall; it blooms for weeks with a fresh burst of blue every morning.

The ornamental grasses remain attractive all winter. Pampas grass is 10 to 12 feet tall with feathery plumes.

It interests people who think of it only as a plant of the southwest. It is fine for dried arrangements. Zebra grass whose foliage is striped with white has similar feathery plumes. The gray Fes-



Pampas Grass

cue is about a foot tall and makes an edging that lasts all winter.

Among all these perennials one can find just the right one of size, shape and color to fit into any particular garden situation. They also make it easy to have something in bloom all the year around.

New Director for D. B. G.

DR. WILLIAM G. GAMBILL has assumed the position of director of Denver Botanic Gardens. He comes to Denver from Ohio University, where he taught courses in general botany, general biology, upper level courses in taxonomic botany, and was curator of the Bartley Herbarium.

A native of Colorado, he attended Boulder elementary and high schools (except for one year in Puyallup, Washington), receiving a tuition scholarship upon graduating from high school. In 1936 he received a Bachelor of Arts degree, cum laude, from the University of Colorado, with a major in zoology and minors in botany and chemistry, and followed this a year later with a Master's degree. In 1947 he took a Ph.D. in botany from the University of Illinois. He has since pursued postdoctoral studies in taxonomic research, bryology and plant ecology.

Dr. Gambill began his professional career teaching two academic years of general science in Lamar Junior High School, 1937-39. He took three years out to serve in the medical branch of the U.S. Army, during World War II, with the rank of technical sergeant. Later, he taught biology and botany in summer sessions at the universities of Colorado and Illinois; was instructor in botany at the University of Wisconsin in 1947-48, and from 1948-52 he held the post of assistant professor of botany at Wabash College, Indiana.

In 1952 he was appointed assistant



professor of botany at Ohio University. His title was changed to associate professor in 1955, and he remained with that institution until the present time. In the succeeding years, in addition to his regular teaching schedule, he was chairman of the botany department for a six-year period; directed the summer high school science workshop and training program for high-ability high school students; served as acting director of the National Science Foundation Institute for junior high school science and math teachers; and continued to collect and identify plants for the Bartley Herbarium. He represented the University at the 1954 (Paris), 1959 (Montreal), and 1969 (University of Washington, in Seattle) meetings of the International Botanical Congress.

Along with his teaching, Dr. Gambill has had considerable administrative experience in coordinating, directing, and acting as chairman for various scholastic activities. His main scientific interest is plant taxonomy along classical lines, with emphasis on plant identification. His professional interest is legumes, but he is well informed on most of the common horticultural plants. His teaching talents are highly respected by his colleagues who say he is a "botanist's botanist," but known to us now he is one with a great interest in horticultural plants.

Dr. Gambill's major academic interests of taxonomy and teaching will bring a new strength to Denver Botanic Gardens. He will bring to the Herbarium and plant collections, his fine taxonomic background, and develop the educational aspects of the Gardens' program to new levels of academic achievement.

He is a member of the Botanical Society of America, American Society of Plant Taxonomists, American Association for the Advancement of Science, American Institute of Biological Scientists, and American Association of University Professors. His articles on specialized botanical subjects have appeared in professional publications. He compiled two sets of laboratory exercises used in first and second semesters of a one-year course in general biology at Ohio University.

The following published works by Dr. Gambill are available for reference in the Helen Fowler Library:

- The Leguminosae of Illinois
- The Living World, Laboratory Exercises, Biology 1
- The Living World, Laboratory Exercises, Biology 2
- Check List of Woody Plants Studied in Dendrology

- Preliminary Check List of the Leguminous Plants of Ohio
- Notes on the Distribution of the Leguminosae in Indiana
- A Taxonomic Study of the Species of Leguminous Plants in Illinois
- Check Lists of Spring-flowering Plants of Ohio University Campus and Vicinity
- The Natural Landscape and Natural History of the Athens State Hospital Grounds
- Woody Plants of the Ohio University Campus and the Athens Area
- The Genus *Lespedeza* Michx. in Ohio
- Our Vanishing Native Flora — Dilemma in Southern Ohio

By coincidence and in the interests of botanical research, Mrs. William H. Crisp, past-chairman of the Editorial Committee of *The Green Thumb* magazine, and a biology teacher professionally, met Dr. Gambill two years ago when she revisited the Boulder house at 2100 Arapahoe Avenue, where she had stayed from 1902-06 while a student at the University of Colorado. She went specifically to check on a 45-foot American chestnut tree in the yard then. It had been planted before the turn of the century when eastern forms of trees were being brought into this area for horticultural purposes.

Dr. Gambill's parents had purchased the property in 1923 and he had grown up there. Other unusual tree specimens, such as cucumber magnolia, tulip, oak leaf mountain ash, and a row of butter-nut trees had been planted in this particular neighborhood and they were used as examples of special types by young "Bill" Gambill's high school biology teacher, Maude Reed. This early personal contact with the plant world certainly helped develop an interest that has led Dr. Gambill back to his native Colorado where he will "help us grow."

A.W.

EXOTICS OF COLORADO

Dipsacus, Teasel

DR. HELEN MARSH ZEINER



TEASEL, *Dipsacus sylvestris*, is an exotic of Colorado whose flower heads are valued by flower arrangers for use in dried arrangements.

Teasel is sometimes cultivated as an ornamental in Colorado, and is occasionally found growing as a weed in wet places. It is a common weed in the eastern half of the United States, where it is often considered an obnoxious weed. However, it is a biennial and can be controlled by mowing so that it never seeds itself. The plant was brought to this country from Europe, where it is very abundant.

Teasel is a tall, coarse, prickly plant whose main claim to fame is its flower heads.

The flowers themselves are small, lavender in color, and packed densely in egg-shaped to cylindrical heads as

much as 3 to 4 inches long. These heads are borne singly at the ends of long stalks. The flowers begin to open in July and continue to open all summer. Since they do not open all at once, they usually appear as a lavender ring around the middle of the flower head.

The flowers are borne among bracts which taper to a long awn with a sharp, straight point. This makes a very prickly flower head.

A cultivated variety with recurved awns (Fuller's teasel, *Dipsacus ful-lonum*) has from very early times been used commercially for raising the nap on woolen cloth. It is assumed that the straight-spined variety was first used, and the curved-spined variety originated from this plant. When it appeared, it was found to be superior for teasing or carding the wool and was cultivated and preserved.

The fine hooked prickles of the cultivated teasel raise the ends of the fibers on woolen cloth better than mechanical devices which man has invented. A great advantage of the natural teasel over wire teeth is that wire teeth will tear threads if there is any resistance, but the teasel breaks and does not damage the cloth.

Heads were first set in a small frame to make a comb or brush, but later were fixed to a revolving cylinder. Dressing of a single piece of cloth is said to require 2 to 3 thousand heads. (*Useful Plants of Great Britain*, Johnson and Sowerby.)

The name *Dipsacus* is from the Greek and means "to thirst." It seems to have been given to the genus because the united bases of the leaves of some species are somewhat cup-shaped and make hollows which will hold water. In ancient times this water was believed to be a remedy for bad eyesight.

Some old herbalists call this plant Venus' bath, because of the rain water collected in the bases of the leaves. Other common names sometimes given to teasel are card teasel, card thistle, and gypsy combs.

Scabiosa, an old favorite garden flower known as pincushion flower or mourning bride, is a relative of teasel. It belongs to the same family (*Dipsacaceae*) but to a different genus (*Scabiosa*). *Scabiosa* is interesting to botanists because it has a flower structure and arrangement somewhat resembling that of the composites.

Strawberries and Colorado Horticulture

S. R. DEBOER

IT WAS IN THE middle thirty years. The Denver Planning Commission had completed its unusual regional plan and both the Boulder Cut-off and the

river road (Valley Highway) were in the making but unemployment was such a towering problem that the commission decided to look toward horti-

cultural work as a solution. A study was made of the marketing of strawberries. The papers mentioned this and two men made the long journey to Denver from Steamboat Springs to talk about this. They were growers of strawberries. They felt that their berries were unusually good but they could not sell them. By the time the Colorado berries were ripe the market was already in the hands of southern growers. The planning board had no answer to this and since the money for the board had dwindled to very little the matter was dropped entirely.

For a long time we had known of the fine taste of the little native strawberries and when Dr. A. C. Hildreth, at that time head of the U.S. Experiment Station, Cheyenne, Wyoming, hybridized the big berries with the

hold their place by being grown under glass and I see no reason why strawberries should not be grown that way. I simply ask the question; I do not know the answer.

The economics of this state are influenced by this condition. For that matter the disappearance of Denver Pascal celery, mountain lettuce and many more items should be studied. Greeley potatoes, once famous, are sold as Idaho potatoes.

The mountain states are an area between three thousand and five thousand feet altitude. The climate is dry and sunny, the soil alkaline. A half century ago we knew that the soil and climate produced less but was of far better quality. That also holds for trees which develop fibre roots and are



native ones, a new variety of much better taste than the other large ones resulted. Today the southern ones are sold in Denver in March and April. The Colorado crops do not come on until May or June. The marketing problem remains the same.

Other products like carnations can

hardier than elsewhere. Perhaps it has the same influence on animals and even on human beings.

Can Colorado horticultural products be marketed and sold on their quality alone? My television talks about mountain grown coffee indicate it as high in quality. Why not strawberries?

Selection and Care of

DRY LAND TREES

A. C. HILDRETH

GENERAL principles of gardening on the semiarid Plains, without irrigation, were discussed in the Autumn 1969 issue of *The Green Thumb*. Yet to be considered are garden plants adapted to dry land culture and how they should be planted and cared for under dry land conditions.

For horticultural purposes, the semiarid Plains may be divided into three regions—Northern, Central and Southern. These regions differ in such horticulturally important factors as minimum temperatures, day-lengths, snow cover and length of growing seasons.

This article applies particularly to the Central Plains Region, which includes, roughly, northeastern Colorado, northwestern Kansas, western Nebraska and southeastern Wyoming.

The most obvious characteristic of this region is the lack of trees. This vast expanse of practically level land, covered mostly with short grass, was depressing to early travelers and settlers.

In 1813, Robert Stuart, while leading a party across what is now western Nebraska, bitterly recorded his feelings. His journal entry of March 29 expresses "hopes of finding at no very great distant day trees of such size, and number, as will put an end to the dreary sameness of the prairie wastes."*

But the white man did not find the Central Plains completely devoid of trees. Indeed, several native tree groups still remain. Compared to the great extent of the region, however, the total area occupied by natural tree stands is, and always has been, extremely small.

Most of such trees are in narrow strips along stream banks, watered by high water tables and by stream overflow. Such favorable conditions are, of course, nonexistent in most of the Central Plains Region.

Of special interest to dry land gardeners are the few upland natural tree groups far removed from any stream influence. These are found on bluffs and steep slopes, in "sinks" and around rock outcrops — features not typical of most of the Central Plains area.

Such topographic features provide some protection from wind and prairie fires and also supply extra moisture by accumulating snow. Of perhaps greater importance in the establishment of natural tree stands, however, these features afford breaks in the predominant grass cover, where young tree seedlings can gain a foothold, free from the over-

*From *On the Oregon Trail : Robert Stuart's Journey of Discovery, 1812-1813*, by Kenneth A. Spaulding. Copyrighted 1953 by the University of Oklahoma Press.

powering competition of dense grass sod.

Nature is guilty of flagrant discrimination against the Central Plains Region. She provided cold-tolerant trees for cold climates and drought-tolerant trees for dry areas in tropical and subtropical climates. There is, however, no cold-tolerant tree that is sufficiently drought-tolerant to become the dominant vegetation of the semiarid Central Plains. For that great expanse of land Nature provided cold-tolerant, drought-tolerant grass.

At best, dry land gardeners of the region must make do with trees that are only moderately drought-tolerant. Such trees on dry land must have intelligent care, otherwise, grass will repossess the land.

Only a few cold-tolerant tree species are even moderately drought-tolerant. Among these, evergreen conifers generally live longer than deciduous broadleaf trees. Evergreen conifers have other advantages. As windbreaks, they give protection at all seasons, and are more effective in controlling drifting snow. As screens, they provide year-around privacy. Beneath evergreen trees, their perpetual shade prevents weed growth. Under deciduous species, however, early spring weeds get a head start while the trees are still bare of foliage.

Compared to broadleaf deciduous trees, conifers have certain disadvantages. On dry land they are generally more difficult to establish. They also grow slower, particularly during the first few years after planting. Evergreen conifers give shade the year around, which is undesirable in certain locations.

For example, an evergreen tree planting on the south side of a feed lot shuts out the winter sun, making the area uncomfortable for the animals.

A home, shaded on the south side by dense evergreen trees, is dreary and chilly in winter and heating costs are higher. For such situations, deciduous trees are ideal as they provide shade in summer and let in the winter sunshine.

Heading the list of trees adapted to dry land culture on the Central Plains are three species of evergreen conifers: Ponderosa Pine (*Pinus ponderosa*), Rocky Mountain Juniper (*Juniperus scopulorum*) and Eastern Red Cedar (*Juniperus virginiana*). These are all native to the region and are adapted to a wide range of soils and sites. Planting stock is readily available from nurseries.

Lumber Pine (*Pinus flexilis*) is native in both the Northern and Central Plains. Although it has not been widely tested, limited trials indicate that this is a promising tree for dry land gardens.

Other conifers worthy of trial on dry land in the Central Plains Region are Austrian Pine (*Pinus nigra*), native in central and southern Europe, and Pinyon Pine (*Pinus edulis*), native from southern Wyoming southward to Texas, Arizona and Mexico.

Scots Pine (*Pinus sylvestris*) is native in much of Europe, western Asia and Siberia. It has been erratic on dry land in the Central Plains area and, therefore, cannot be recommended for general planting under such conditions. It should be tried as a dry land tree only on deep sandy soil.

There is no evergreen broadleaf tree suited to Central Plains climate. Even the list of deciduous trees adapted to dry land culture in the region is short. Only three such species can now be recommended: Hackberry (*Celtis occidentalis*) is native on much of the Central Plains. It is suited to a wide variety of soil and climatic conditions. Its growth is somewhat slower than that of other adapted deciduous trees.

Honey Locust (*Gleditsia triacanthos*) is not native to the Central Plains but occurs over a wide area in midwestern, eastern and southern states. This is the most satisfactory deciduous tree for dry land planting on the Central Plains. It transplants easily, grows rapidly when young and attains a greater height than other recommended deciduous species. Care should be taken to plant only the thornless variety (*inermis*), as the wicked thorns of the common type may injure people and animals and damage pneumatic tires.

Russian Olive (*Elaeagnus angustifolia*) is native in Europe and western Asia. Its silvery foliage and fragrant yellow flowers make this a desirable ornamental tree. It is also a good tree for screens, hedges and windbreaks. It transplants easily and is long-lived.

Three other deciduous tree species were formerly much planted on dry land in the Central Plains Region. Because of inroads or threats of insects and disease, however, these trees no longer can be recommended: Green Ash (*Fraxinus pennsylvanica* var. *lan-ceolata*) is native in the region. This tree was extensively planted on dry land in the late 1800's and the early 1900's. But attacks of borers, encouraged by injury to the trees from drought and hail, resulted in removal of this tree from the list of species recommended for dry land planting on the Central Plains.

American Elm (*Ulmus americana*) is native in the region. It is among the most drought-tolerant trees for Central Plains planting. This elm is subject to attack by European Elm Scale, which weakens the trees, blackens the bark and excretes the sticky honey-dew that drips on everything beneath the infested trees. The inexorable march of Dutch Elm Disease westward, now as far as Colorado, has finally put an end to

American Elm planting in the Central Plains Region.

Siberian Elm (*Ulmus pumila*) was formerly called Chinese Elm, but that common name is now reserved for another species. Despite its many faults, Siberian Elm has been the most satisfactory tree for dry land planting on the Central Plains. It transplants easily, grows rapidly and attains a greater height than any other dry land tree. Unfortunately it is susceptible to Dutch Elm Disease. Until a practical control is found for this disease, Siberian Elm cannot be recommended for planting in this region.

The native cottonwoods are the largest and sturdiest-looking trees that grow on the Central Plains. Such characteristics have naturally led to the erroneous assumption that these trees are able to withstand drought. The fact is, however, they belong to the group of trees that are cold-tolerant but not drought-tolerant.

Although they have a wide natural distribution in the region, they do not grow under truly dry land conditions. Instead, they occur only along streams or in other places where they receive much more water than that which falls directly as natural precipitation.

Since the early years of settlement in this region, frequent attempts have been made to grow cottonwoods on typically dry land. The results always have been the same — failure. The trees may even flourish for a few years during a period of above-normal rainfall, only to die when a drier period puts them under stress for moisture.

Land intended for tree planting should be plowed and clean-tilled the year prior to setting out the trees. The main purpose of this fallow year is to accumulate more moisture in the soil, so that the newly planted trees will get a better start. Fallowing also helps to

kill out sod and prevents weeds from going to seed.

If the land is infested with noxious perennial weeds, such as Canada Thistle (*Cirsium arvense*), Bindweed (*Convolvulus arvensis*) or Rover Bellflower (*Campanula rapunculoides*), these pests should be eliminated by spraying with appropriate herbicides. Repeated sprayings may be needed to destroy any new sprouts that may spring up after the first treatment.

All grazing animals, such as horses, ponies, donkeys, cattle, sheep, goats and pigs, are natural enemies of trees. They may browse young trees back to the ground. They gnaw off bark from trunks and main limbs and break off small trees and branches by rubbing against them.

Continued tramping around the trees by such animals packs the soil. This prevents penetration of water and restricts the oxygen supply to the roots.

The foliage and tender branches of larger trees are also browsed by such animals, as far up as their necks will stretch. The resulting high-headed trees admit sunlight and wind, both of which increase moisture evaporation from the soil surface. The increased sunlight also encourages the growth of weeds beneath the trees, further decreasing the soil moisture.

Trees on dry land must be protected from damage from livestock. The best protection is an adequate fence.

The design of a dry land tree planting should provide for a clean-tilled strip or border, about 16 feet wide, entirely around the planted area. This affords space into which the outside trees of the planting can spread their roots. It also protects the planting from grass fires and prevents grass sod and weeds from encroaching upon the trees.

This border should be tilled each time the trees are cultivated. It should

be maintained even after it is no longer possible to operate cultivating machinery among the trees.

Early spring is the best time to plant dry land trees on the Central Plains. At that season, the wettest part of the year is normally just ahead, and the roots have a long period of good growing weather in which to become established before the drying heat of summer.

Small to medium sizes of planting stock are more likely to survive on dry land than large sizes. Bare-root nursery stock is generally satisfactory for broadleaf species but the hazards are much greater for bare-root conifers. Under dry land conditions, container-grown or balled-and-burlapped stock is recommended for all conifer plantings, even though the initial cost is much higher.

The federal government cooperates with state governments in supplying low-cost, bare-root nursery stock to farmers and ranchers for windbreaks and conservation plantings. Certain commercial nurseries specialize in producing bare-root nursery stock, some of which is suitable for dry land. A few local nurseries offer container-grown stock of both conifers and broadleaf species that are recommended for dry land culture.

Some dry land gardeners plant only container-grown stock, but prefer to grow their own, thereby reducing the initial cost. They buy bare-root seedlings, both coniferous and broadleaf, and plant them in cans. These are placed in a spot sheltered from wind and handy to water for irrigation. These canned trees are grown one year, when they are ready for transplanting. If this procedure is started the same spring that fallowing of the planting site is begun, a supply of container-grown stock will be available when the land is ready.

Planting losses are usually very light when container-grown stock is used. If a few trees in containers are kept for replacement, vacancies can be filled without the loss of a year. The time of planting is not so critical with container-grown stock as with bare-root stock. The fact is, replacements, or even whole dry land plantings, can be made well into summer if container-grown stock is employed.

Early Plains foresters devised a simple but effective method for protecting newly-planted trees. One end of a wooden shingle is driven into the soil on the south side of the tree. The protruding part shelters the tree from the sun during the greater part of the day. In late fall the shingle is pulled up and reset on the northwestern side of the tree to protect it from prevailing winter winds.

From the Office of the President

To: All Plant Sale Volunteers

Sincere thanks from the Board of Trustees and myself to each of the more than 300 volunteers who contributed so willingly and effectively to the annual Plant Sale May 8 and 9.

Neatly packaged in its new location near the Conservatory, the sales area was more unified, each special booth led to the next and everyone wondered why the sale hadn't been held here years earlier.

Despite the October freeze and a cool, dry spring, the committee chairmen, with the cooperation of local growers and nurserymen, managed to assemble an even greater selection of good plants, if that was possible. Perfect weather, generous customers and efficient volunteers joined to make this vital public relations project very productive for Denver Botanic Gardens. Once again we have benefitted, for without this help in supplementing the city's allocation of operating funds much that is done in our Gardens could not be accomplished.

Our hearty thanks to all of you, the various committee chairmen, the plant contributors and growers, the sales force, the efficient cashiers, the courtesy loaders, the pick-up crew and everyone else connected with this immense cooperative effort.

Marnie Honnen
Fran Morrison
Mary Washburne

} Co-Chairmen
} Plant Sale Committee

JOHN C. MITCHELL
President, Board of Trustees



Focus
on
*Ficus
carica*
in the
Boettcher
Memorial
Conservatory

COMMON FIGS are the fruit of *Ficus carica*. The species name comes from Caria, an ancient country of S. W. Asia Minor. Figs belong to the *Moraceae*, mulberry family, which has about 55 genera embracing 900 species, in tropical and temperate regions of both hemispheres. Many members of the family are of economic importance. The genus *Ficus* contains some 600 species.

Ficus carica, common fig, is considered to be a native of southern Arabia. The fig is of very ancient culti-

vation. Many varieties were known to Theophrastus, the Father of Botany, who gave a detailed account of fig cultivation in his *Inquiry into Plants*.

The common fig is a deciduous shrub or small tree, seldom reaching a height of more than 25 feet. The tree has light grey bark and has a rather awkward shape. The main trunk is short and the irregular branches form a round head. Leaves of *Ficus carica* deviate from the *Moraceae* family trait. The general outline of the leaf is usually oval, but there are 3 to 5 lobes. The leaves are about

6 inches long, light green, rough and hairy on the upper side, paler and downy on the under side, and marked with prominent leaf venation. *Ficus carica* is one of the few deciduous species in the genus. In young trees the rest period is so slight that new shoots will start very soon after the leaves are off. Mature trees may be without leaves for several months.

The fruit is a syncarp, a fleshy, pear-shaped receptacle with a narrow aperture at the apex. The fig is a peculiar plant in that scores of minute flowers are hidden within the receptacle and bloom and mature in the dark interior. Flowers of the newer horticultural variety, known as the common fig, will develop seedless fruits without being pollinated. Trees of other varieties such as the Smyrna-type will not set fruit well without pollination. When fig flowers are pollinated, pollen must be supplied from a kind known as caprifig. In the caprifig, some of the pistils are modified so that the styles are short enough for the insect, *Blastophaga psenes* or fig wasp, to deposit its eggs in the ovaries. When the insects from these eggs become adults, they emerge through the opening of the fig, the eye at the apex, and become covered with pollen. When they enter through the eye of another fig and move about try-

ing to deposit eggs, this pollen is spread on the stigmas, thereby ensuring seed production. Two crops of figs are produced annually. The first crop, borne on the old wood, and the larger more juicy fruits are usually eaten fresh. The second drop is produced in the axils of the leaves. They are used fresh or are dried.

The fig may well have been man's first domesticated plant. Once the puzzling details of reproduction in figs became known, fresh and dried figs became so cheap that they were "the poor man's food" in Mediterranean countries. The mature leaves are often harvested for fodder. Fresh young leaves of *Ficus carica* are also used in dyeing. Tin mordant gives the brightest yellow and chrome a dull color.

The commercial fig trees are nearly always propagated by cuttings and so are on their own roots. Pieces of wood about 8 inches long, one, two, or three years old are taken in the dormant season, buried with the bases up until spring, when they are planted so that the tops are level with the surface of the soil.

Several varieties of common figs, as well as many other members of the *Ficus* genus, may be seen in the Boettcher Memorial Conservatory.



Recent additions to the Helen Fowler Library include:

A revised edition of shrubs and vines for American Gardens, Wyman; Flower Growing for Flower Arrangement, Nehrling; Dwarf Conifers, Welch; Complete book for Gardeners, Snyder; Folklore and Symbolism of Flowers,

Lehner; Ecological Glossary, Carpenter; Alice Eastwood's Wonderland, Wilson; and Propagating House Plants.

By the gift of Jane Silverstein Ries, the library has acquired a copy of Frederick Law Olmsted, Sr., founder of Landscape Architecture in America, by Fabos.

A stylized sunburst graphic with numerous thin, radiating lines of varying lengths, centered behind the title.

Outdoor LIGHTING

JOHN DILLAVOU

Landscape Architect, City Planner

OUTDOOR LIGHTING is used to illuminate walks, steps, and living areas. It is used to dramatize and feature various plant materials, sculpture and other garden features.

New improvements in wiring materials mean that wires themselves do not have to be buried in rigid conduit as once was the case. Many waterproof materials have been developed and incorporated into wiring materials so that the wires can even be left out on the ground, especially with the low voltage lighting systems.

If you use electric lawn mowers, hedge clippers, barbecues and lawn edgers-trimmers, you may want to spot several outlets in and around your garden areas. This means the installation of a 110-120 volt system which should be on a separate house circuit. An average 15 amp circuit will support a maximum of approximately 1500 watts. For this service you may want to call in an electrician and be sure that your system meets all city and various county codes.

But for the average yard and garden area, the homeowner should explore the use of low voltage lighting. These systems are not new, we have had this type of lighting in our cars for years. Not only is it effective but safe to use. You can dig in a plant bed and cut a wire without a shock. A child can unscrew a bulb and place a finger in an empty socket without danger as

compared to a 110 volt system. You can even handle the system underwater in pools and fountains with the current on without harm. If you do cut the wire it is a simple matter to splice it back together.

You can generally buy a kit with a transformer (an electrical device that reduces the house current to the 12 volts), 50-100' of cable and from 6 to 8 lights for less than \$100.00. Most of these have the flood light type of lights and you can add others to this system. Addition to the cable is made through a snap-on type adapter-connector which usually punches into the wire to make contact. Depending on the wattage 6-10 lights are usually all that one transformer can handle. Some transformers come equipped with a timing device which will automatically turn on and off at a predetermined time, the entire system of lights. Here again you may wish to run a separate house line to supply the transformer.

Never have these lights shine directly on the patio but direct them into plant beds, reflect them off fences or shine them up into trees. One nice arrangement is to buy a basic kit of the six floodlights and add to this two mushroom lights to give more light on the patio itself. It might be that you will want one set to light the front entry, another for the yard and patio area in back. Color filters (usually in blue,

pink, amber and green) will create lighting effects never dreamed possible.

You will have to experiment, probably for several nights before you actually install your lights. Never try to locate them during the daytime. Determine at night where you want them to be placed and experiment with the colors before spotting them. All wires, if run through plant beds, should be buried at least 6" below the surface of the bed to avoid cutting them when digging. Sometimes they can be buried just under the surface (turned up by a trowel) when adjacent to walks or edging.

You will find all types of fixtures available to light your walks, drives, plants, steps, pools, trees, fences, etc. You can easily adjust and change these lights from one location to another as plants grow or your garden areas change. You do not have to buy this equipment in kits but can buy the component parts to make your own arrangements. You can change these systems conveniently to suit your own tastes whereas once a 110 volt system is in, it remains in. You can find low voltage systems, kits and components at almost all electrical suppliers, hardware stores and landscape nurseries.

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BOOKS

HANDBOOK OF ROCKY MOUNTAIN PLANTS by Ruth Ashton Nelson, Publisher, Dale Stuart King, Tucson, Arizona, 1969, 231 pp.

For those who want to identify plants but who are neither botanists nor natural scientists, this is your book. The author states it is for "those who drive the highways, ride the horse trails, walk the paths, roam the canyons and climb the heights." But it is also a useful handbook for the classroom as well as for the amateur botanist.

The author is the wife of the late Aven Nelson, one of the great Rocky Mountain botanists, professor of botany and curator of the herbarium at the University of Wyoming. Together they spent many summers collecting plants and winters working in the herbarium. For Mrs. Nelson this book is the culmination of many years of study and observation.

The area of the Rocky Mountains explored is about 5000 ft. altitude and extends from northern Arizona and New Mexico to Canada. The national parks and monuments receive special attention.

Ecology and plant life in general are described. The factors that influence the successions of plant life and why there are so many different species of plants in this region are explained. Carefully chosen photographs illustrate plant associations. On the end pages of the book the life zones are diagrammatically shown.

Plant identification is outlined in simplified keys and made easy to interpret by line drawings and color photographs. The keys are based on the most obvious characteristics to fit the conspicuous plants. Where technical terms are used they are defined in a glossary.

More than 400 line drawings by Dr. Dorothy V. Leake, botanist and teacher, illustrate plant parts, flower parts and botanical terms.

975 species in 88 families are recorded and described. More than a third of these are illustrated by line drawings. Historical facts, uses by Indians and biographical material make interesting reading.

Handbook of Rocky Mountain Plants by Ruth Ashton Nelson. 12 species of ferns, horsetails and club-mosses are identified.

These plants are sometimes overlooked by the nature enthusiast. There is also a bibliography of useful references.

— KBC

Paperback \$4.95

Hard-cover 6.95



PLANTS OF ROCKY MOUNTAIN NATIONAL PARK by Ruth Ashton Nelson. Published by the Rocky Mountain Nature Association in cooperation with the National Park Service, U.S. Department of Interior. Copyright 1970, Rocky Mountain Nature Association. First published in 1933, revised 1953.

Third edition, 1970, in full color, 168 pp. Based on the two earlier editions and enlarged after much additional study and fieldwork by Mrs. Ruth Nelson and others.

This is an illustrated guide to the wild flowers of Rocky Mountain National Park with emphasis on outstanding field characteristics of plants and their habitats.

—KBC

Paperback \$3.50

Hard-cover 4.95

Colorado's Columbines

CLAIRE NORTON

COLORADANS can justly be proud of their state floral emblem, the enchanting Blue Columbine, *Aquilegia caerulea*, James. It embodies the blue of our skies and the white of our snow-shrouded peaks. It has grace and dignity. Its very name, *Aquilegia*, is thought to be derived from "aquila," the eagle, symbol of fearlessness, without which our State could not have been built. And its vernacular name has the same derivation as that of Columbus and of Columbia, land of the free, singularly apt for the Centennial State.

From the foothills to timberline, from early to late summer, this beautiful flower is ever a thrilling sight to the mountain visitor. In most minds it is associated with aspens, but Edwin James, the first plant hunter to these parts who collected the species, discovered it in a glade near Palmer Lake where scrub oak thickets are more familiar than are aspen copses. Some of the showiest specimens are those met with near a fallen giant at the edge of subalpine spruce and fir forests, or among the willows and on boulder fields at the outposts of timber. Here the blues are most celestial; here the buds, and even the sepals and spurs, may shade to pink or nearly white; and here the flowers attain their greatest size, sometimes measuring fully four inches across.

To the occasional spurless form of *A. caerulea* has been applied the vari-

etal name of *Daileyae*, first used by that intrepid woman botanist who explored the State before the turn of the century, Alice Eastwood. The type locality for variety *Daileyae* is Estes Park.

It may come as a surprise to some Coloradans that *A. caerulea* is not our only representative of this well-loved genus. As least seven distinct additional species and several hybrid varieties are recognized as indigenous within our borders. Even more have been reported but not authenticated. None, however, is as abundant as the Blue Columbine, and few as garden-worthy.

A. saximontana, Rydb., a gem of a plant, rewards the climber of alpine heights, mainly in the Central Colorado Rockies. It is relatively plentiful in rock crevices of boulder fields around Grays and Torreys Peaks; it occurs on Pikes Peak, James Peak, and in Rocky Mountain National Park, but it has a limited distribution elsewhere. The Rocky Mountain Columbine, as it is called, has the same general coloring as *A. caerulea*, but its thumbnail size blooms strongly curve their very short spurs inward toward the stem. The entire plant is diminutive, seldom attaining six inches, and the fairy-like blossoms are never raised much above the blue-green foliage mass.

One of Colorado's rarer wild flowers is the deep scarlet *A. elegantula*,



A. caerulea



A. saximontana

Colorado



A. elegantula

Solumbines

Gray, which well might be called the Elegant Columbine. Campers and hikers off the beaten track in the southern mountainous areas of the State have the best chance of discovering it. It is a higher montane and sub-alpine zone species, compact and about a foot tall; its brilliant spurs are held erect, its numerous exserted stamens and five slender styles form golden tassels. *A. triternata*, Payson, coming into our range from the Southwest, is somewhat similar, but with longer, more divergent sepals which are relatively dull red. Its specific name refers to the "thrice-in-threes" character of its leaves.

The variable *A. micrantha*, Eastw. extends into Western Colorado from the desert region of Utah and hugs the midday-shaded, seepy strata of sandstone cliffs where once the Cliff Dwellers trod. Its color ranges from white, yellow, blue to pink, with pale yellow being the most dominant hue. Its foliage is matted and sticky, becoming gray-brown from windblown dust. White to pinkish *A. micrantha mancosana*, Eastw., once named *A. Eastwoodiae*, Rydb., has spurs merely sac-like or totally lacking, and is apparently confined to Southwestern Colorado.

A. flavescens, S. Wats. grows farther north in the Western part of the state. Its flowers are creamy-yellow, somewhat small, and lack the long spurs so admired in our Blue Columbine. From the dry, hot, shaly slopes of Piceance Creek near Meeker, a bright pink and yellow, blue-foliaged Columbine was collected only a few years ago and named *A. Barnebyi*, Munz.

We have never seen *A. scopulorum*, Tidestrom, also reported as coming over from Utah and Southwestern Wyoming into our state. It is said to

be a handsome dwarf of lime screes with pastel-hued flowers. The blue form of this could have been confused with *A. Jonesii*, Parry, in reporting the latter species as a member of the Colorado Columbines. Both have abnormally large flowers, upfacing on little tufted plants, better balanced by the length of the spurs in *A. scopulorum*.

The final Columbine credited to Colorado is one of the world's important *Aquilegias*, since it has played a part in the development of the long-spurred garden hybrids. This is golden yellow *A. chrysantha*, Gray. Ranging up from Northern Mexico it is not infrequently to be seen on hillsides and in canyons around Colorado Springs. Like the Blue Columbine, *A. chrysantha* carries its showy flowers with much grace above good foliage and has long, slender, wide-spreading spurs.

A. caerulea and *A. chrysantha* have been in cultivation for several decades. The former is said to have appeared in English gardens about 1864 and the latter in 1873. These two species are readily available; the others are harder to come by, but show up occasionally in native plant lists.

For cultivation of most native species of *Aquilegia* a light garden loam, humus enriched, is best, although *A. caerulea* and *A. chrysantha* will succeed on heavier soils and tolerate a fairly high alkaline reaction. All prefer sun, but some shade during the heat of the day in midsummer is desirable in dry climates, particularly for species such as *A. saximontana* from higher altitudes.

Most columbines are rather short-lived, two, three, four years being the maximum when allowed to set seed. Where self-seeding is not desirable, a stock of replacements should be maintained. Seed planted in January will yield good transplants for mid-April

or early May plantings. Some of these may bloom the first season, and all can be counted on for flowering the following year.

January seeding in flats or cold-frames is recommended. Seed held over a year after ripening germinates more slowly and may require stratification. Screened peatmoss, or a mixture of equal parts sharp sand, screened peatmoss and loam are good planting media. Seed should be spaced evenly in rows and covered one-fourth inch deep.

Germination usually takes three weeks to a month and seedlings are ready for potting into disposable pots or bands in about forty-five days. By April 15, seedlings started January 1 can go into permanent quarters, spacing eighteen inches apart for massed border effects or three feet apart for maximum bloom of the large-flowered species. *A. saximontana* can be spaced ten inches to a foot apart as an attractive edging plant in the border, but always looks more at home in a rock garden pocket.

annual garden show

WENDY BURNS

DENVER GARDENS will once again be in the spotlight when the Denver Botanic Gardens Guild sponsors the 1970 Terrace and Garden Tour, Thursday, July 30, from 10:00 a.m. to 5:00 p.m.

A refreshing new feature this year will be wine tasting and iced tea which will be served at Botanic Gardens House, 909 York Street, from 2:00 p.m. to 5:00 p.m.

Once again, hand-thrown herb pots and herb vinegar will be on sale on the day of the Tour.

The (nine) houses on the Tour are located in the Denver Botanic Gardens area of Denver. A brief description of each follows:

1) Mr. and Mrs. Bruce Dines—350 Laylord. This Mediterranean-style house with its easy-care, owner-maintained garden, has interesting native material such as aspen trees and kinkinnick. Under shade of spruce and fir, one sees ground cover and other

cool shades of green surrounding several unique antiques including Spanish nunnery bells and an authentic Pompeian stone and iron well-head. A separate, covered barbecue area adds a restful spot for the family.

2) Mr. and Mrs. Howard Rea — 130 Vine. An all-green color scheme carries throughout this "outdoor living" area. A lovely bronze-stepped fountain by George Hall of Newport Beach, California, is the focal point of the patio area, against a background of potted plants and raised beds of evergreens. A brightly-colored awning and terrazzo dance floor add to the party atmosphere.

3) Mr. and Mrs. Charles Sterne — 161 Vine. The quiet elegance of this lovely French townhouse with its muted tones of blues and salmon, carries from the house and sun room to the garden. As one steps down into the formal lawn and is greeted by salmon geraniums, you see the semi-circular grape

arbor which frames the small marble Italian girl, and the pool with its water-lilies and goldfish.

Coming as a surprise is a large circular garden of roses and other colorful plants around a specimen Hackberry tree.

4) Mr. and Mrs. Raymond Sargent — 2124 4th Avenue. Beginning with the spacious covered patio, aglow with colors accented in Portuguese decorative tiles, and beautiful tri-level flower boxes behind a charming reflecting pool, the feeling here is peaceful and quiet. A formal rose garden, bordered in Korean boxwood and privet, provides a subtle contrast to the belvedere farther back in the yard with the greenery of house plants outdoors for the summer.

5) Mr. and Mrs. Albert J. Coleman — 461 Humboldt. This interesting house is built on part of the site of the old Gentlemen's Riding and Driving Club of Denver. The original carriage house still stands as one wing of the L-shaped home, with an expanse of lawn and garden stretching out before it. A fountain from the San Francisco World's Fair is a lovely focal point, surrounded by the colorful gardens and many trees which form a natural screen from the street.

6) Mr. and Mrs. John Lantz—1142 Humboldt. A small backyard is transformed into an immaculate Japanese garden with its lovely pond and waterfall with its stream winding thru several levels of rocks, greenery graveled paths and Bonsai trees. An authentic poled fence, the small lawn area and Cheesman Park make a natural frame for this open light garden.

7) Mr. and Mrs. Joseph Obering — 1050 Humboldt. The formal terraced bank filled to overflowing with glowing annuals, is a colorful greeting in this front yard. As a contrast, the backyard

with its huge spruce trees and shaded areas has free-form border gardens, a tree house, and play area. All are used and enjoyed by the family in their happy way of life.

8) Mr. and Mrs. Cris Dobbins — 770 High. A climbing stairway leads thru a wooded area at the front of the house to a large covered patio with a charming fountain surrounded by colorful geraniums. A second stairway descends to an all-green garden bordering an expanse of lawn and a walkway with an ideal view of a lovely sculpture, the terraced levels and an unusual collection of fireplace grates on display.

9) Mr. and Mrs. John Falkenburg — 831 St. Paul. A vegetable garden, cared for by the children, a culinary (herb) garden, grape arbor climbing over the gazebo roof, a Shakespeare path, and numerous specimen plants are a few of the many sights to be found in this delightful home-care garden. The yard is not only lovely to see but is thoroughly used and enjoyed by the family as well.

Tickets for the Tour are available at the Gift Shop in Boettcher Memorial Conservatory, 1005 York Street, telephone 297-2348; Botanic Gardens House, 909 York Street, telephone 297-2547; or through any member of the Denver Botanic Gardens Guild. The tickets will also be available at the individual gardens on the day of the Tour. Cost of the tickets will be \$4.00.

Bus transportation will not be available this year since the gardens are located in an area convenient to the Denver Botanic Gardens and ample on-the-street parking will be available at the individual homes on the tour.

A membership blank will be included on the ticket this year and now is the perfect time to join the Denver Botanic Gardens. Come grow with us!

A. C. Hildreth Receives Award

AUBREY C. HILDRETH, one of the nation's leading authorities on Plains horticulture, received "The Arthur Hoyt Scott Garden and Horticulture Award" at the June 8 commencement exercises of Swarthmore College.

The Scott Award, a sum of \$1,000 and a round gold medal with a man tilling and cultivating the ground on one side and the tree of life on the other, honors Dr. Hildreth for his achievement of great merit; a recognition of work in creating and developing a wider interest in gardening."

Dr. Hildreth, 76, Director Emeritus of the Denver Botanic Gardens, began his long career teaching college and has served on various government research projects including those to improve the quality of blueberries, the hardiness of chrysanthemums and the yield of the guayule rubber plant. He was Superintendent of Cheyenne Horticultural Field Station since its creation by Congress in 1930 to improve High Plains and Rocky Mountain Horticulture until his retirement in 1959, except for World War II when he was in charge of the rubber plant experiments in California and 1955-57 when he was an Agricultural Experiment Station Advisor with the U.S. Operations Mission in Kabul, Afghanistan.

In 1959 he became Director of Denver Botanic Gardens and the grounds were developed and a Children's Garden begun under his direction. He retired from the Gardens in 1965, and remained a consultant for an additional year. An irregular contributor to newspapers and magazines for more than 50 years, he continues to write a gardening column for the *Rocky Mountain News* in Denver and represents the

Central Great Plains-Rocky Mountain region as a member of the 15-man National Arboretum Advisory Council of the U.S. Secretary of Agriculture.

His life's work of finding out how plants adjust to drought and cold and in developing better horticulture in the high, dry, cold, bright climates has earned him numerous awards. He received the John Robertson Memorial Award from the South Dakota Horticultural Society in 1960, an Association of American Nurserymen Award in 1960, an American Horticultural Society Award in 1961, an Outstanding Service Award by the National Chrysanthemum Society in 1965, and an award from the Colorado Nurserymen's Association in 1970.

The Scott Award was accorded Dr. Hildreth by a committee chaired by Swarthmore President Robert Cross and composed of one representative each from the Horticultural Societies of Pennsylvania, New York, and Massachusetts, a representative of a nationally known garden or nature organization, a representative of a nationally known flower society, an editor in the general Philadelphia area, and two persons appointed by the chairman.

The award was founded in 1929 in memory of Arthur Hoyt Scott, owner of the Scott Paper Company and a Swarthmore College graduate of 1895, who became treasurer of the American Peony Society and later a founder and treasurer of the American Iris Society. The award has been given 16 times since 1930, the last time in 1967. The Arthur Hoyt Scott Foundation which has offices at the College, maintains an extensive flower and tree collection on the campus.

COMMON POISONOUS PLANTS

DR. JAMES R. FEUCHT
Extension Area Horticulturist

MANY PLANTS grown inside and outside of the home have poisonous properties. Some, while poisonous when taken in quantity or in certain forms, are also valuable for their medicinal effects. Others, while known to have poisonous effects when ingested in very large quantities, are common foods. Still others are very toxic when ingested in small quantities.

In some cases, plants grown "in the wild state" are more poisonous than their cultivated counterparts. Wild forms of the lima bean, tomato, celery, parsnip and even carrots possess toxic principles. Yet, the cultivated forms are safe.

In some cases, two botanically indistinguishable plants may differ in degree of toxicity. A classic example is lima bean and "Java" bean, the former edible, the latter poisonous. Both are classified technically as *Phaseolus limesis* but some of the wild "Java" forms contain as much as 320 milligrams of a substance (phaseolunatin) which yields deadly hydrocyanic (prussic) acid in the human body.

The poisonous properties of plants are found in many forms but can be roughly classified into seven groups as follows:

(1) *Alkaloids* — These are perhaps the most common. Over 100 types are known and includes some known well in medicine, such as: atropine, lobeline, nicotine and codeine.

(2) *Glucosides* — Crystalline materials which are decomposed by enzymes to produce toxic effects. A well-known material in medicine is digitalin, a heart stimulant.

(3) *Organic acids* — Usually form in the body from enzymatic action on other materials. Prussic acid is a good example.

(4) *Neutral Principles* — Crystalline bodies of varying effects. Coumarin is in this group.

(5) *Resins* — Complex materials formed from volatile oils.

(6) *Volatile Oils* — Such as toxicodendrol in poison sumac.

(7) *Acrid juices* — Such as those found in *Euphorbia* (spurges). Some of the juices cause severe dermatitis.

Mode of Poisonous Action

The mode of action of the various poisons in plants are usually classed into four groups namely:

- (1) those acting on the brain causing narcotic, deliriant or inebriant effects;
- (2) those effecting the spinal cord resulting in paralysis and convulsions;

- (3) heart depressants and stimulants;
- (4) and . . . irritants of the digestive tract, nervous system and skin.

Some Safety Rules

Because a plant or a part of a plant in your home or yard contains a poison, is no cause to destroy it. You should know which ones they are, however, and which parts are poisonous.

It is safest to instruct your children not to pick or eat *anything* growing in the yard except under your supervision. This rule not only prevents accidental injury or death from natural plant poisons, but also prevents potential hazards from ingesting plant parts containing pesticide residues.

Remember that children are naturally curious and will try almost anything once. Even bitter-tasting leaves and tart green apples won't stop them.

The U. S. Public Health Service reports that about 12,000 children ingest poisonous plant parts each year. Many of these plants are so common that their toxic qualities are not suspected.

SOME COMMON POISONOUS PLANTS

House Plants and Jewelry

Plant	Toxic Part	Toxic Substance and Symptoms
azalea (<i>Rhododendron</i> species)	all parts	Alkaloids — produces nausea, difficult breathing, coma. Fatal.
Castor bean (<i>Ricinus communis</i>)	seed pulp (oil safe)	Contains a glucoside, ricin and alkaloid, ricinone. A strong purgative. Two seeds can be fatal.
Daffodil (<i>Narcissus</i> species)	bulb	Contain narcissine, an alkaloid. Causes acute gastro-intestinal problems. May be fatal.
Dumbcane (<i>Dieffenbachia</i>) Caladium is also similar	all parts	Calcium oxalate crystals causing intense burning and mouth irritations. Death has resulted where tongue swelled blocking air passage.
Elephant's Ear (<i>Colocasia antiquorum</i>)	all parts	Same as Dumbcane.
Giacinth (<i>Tyacinthus orientalis</i>)	bulb	Same as Daffodil.
Mistletoe (<i>Phoradendron avescens</i>)	berries	Fatal.
oleander (<i>Verium oleander</i>)	all parts	Heart stimulant similar to digitalis (see Foxglove under garden flowers).
oinsettia (<i>Euphorbia ulcherrima</i>)	leaves	Contain Euphorbin which is deadly. One leaf can kill a child.
osary pea ecatory-bean (<i>lbrus precatorius</i>)	seeds (glossy scarlet and black seeds commonly used on imported jewelry).	Considered among the most toxic of natural materials. Less than one seed when chewed has caused death in children.

Plants of the Flower Garden

<i>Plant</i>	<i>Toxic Part</i>	<i>Toxic Substance and Symptoms</i>
Autumn crocus (<i>Colchicum autumnale</i>)	bulb	Contains colchicine which will cause vomiting and nervous excitement. In plants, it is used to double chromosomes in cells.
Bleeding heart (<i>Dicentra species</i>)	foliage, roots	Must be eaten in quantity. Causes convulsions and labored breathing.
Buttercup (<i>Ranunculus species</i>)	all parts	Contains a glucoside which acts as an acrid narcotic. Paralysis results in large doses.
Delphinium and Larkspur (<i>Delphinium species</i>)	all parts	Alkaloids (5 types) which produce severe digestive upset and nervous excitement.
Foxglove (<i>Digitalis purpurea</i>)	leaves and seeds	Contain digitalin and other glucosides which stimulate heart action. Overdose is usually fatal.
Iris (<i>Iris species</i>)	all parts	Contain the glucoside irigenin and acrid resin, iridin. Causes acute gastro-intestinal problems.
Leopardsbane (<i>Doronicum species</i>)	leaves	Contain arnicin causing dermatitis in some people.
Lily of the valley (<i>Convallaria majalis</i>)	all but ripe fruit	Contains convallamarin and convallanin. The former acts like digitalin (see Foxglove) and the latter is a purgative.
Monkshood (<i>Aconitum species</i>)	leaves, stems and roots	Contain several alkaloids related to aconitine. Some species of <i>Aconitum</i> were used for arrow poisons in India. Death is sudden.
Morning glory (<i>Ipomoea species</i>)	seeds	Produce LSD-like effects but can cause death from mental disturbances.
Pinks (<i>Dianthus plumarius</i> and others)	leaves	Contain saponins which dissolve blood corpuscles.
Peony (<i>Paeonia officinalis</i>)	roots	Contain acrid juice which may cause paralysis.
Snowdrop (<i>Galanthus nivalis</i>)	bulb	Contain narcissine. Symptoms like those of Hyacinth. (See under House plants).
Spurge, Snow-on-the-Mountain (<i>Euphorbia</i> several species)	leaves	Contain euphorbin and other principles that are strong purgatives. Some people obtain rash from milky sap.
Stonecrop (<i>Sedum acre</i> and others)	leaves	Sap produces inflammation of skin.
Ornamental Sweetpea (<i>Lathyrus species</i>)	seeds	In quantity, seeds can cause death due to prussic (hydrocyanic) acid.
Violets (pansies) (<i>Viola cornuta</i> <i>V. tricolor</i> and others)	seeds	Contain glucosides and myrosin. In quantity the cathartic effects can be serious to a child.

Plants of the Vegetable Garden

Plant	Toxic Part	Toxic Substance and Symptoms
Potato (<i>Solanum tuberosum</i>)	all green parts	Strong alkaloid causing cardiac depression. Can be fatal.
Rhubarb (<i>Rheum rhaponticum</i>)	leaf blade (stalk edible)	Oxalic acid. Causes kidney rupture.
Tomato (<i>Lycopersicon esculentum</i>)	green parts	Same as in potato. Fried green fruit is edible.

Trees and Shrubs

Apple (<i>Malus species</i>)	seeds	In quantity, seeds produce cyanide complex in blood. Can be fatal.
Buckthorn (<i>Rhamnus species</i>)	leaves, fruit	Contain frangulin, a strong purgative.
Cherry and Peach (<i>Prunus species</i>)	leaves, twigs, seeds	Same as in apple.
Golden-chain (<i>Laburnum species</i>)	seeds	Contain cytisine and has caused fatalities.
Horsechestnut (<i>Aesculus hippocastanum</i>)	seeds (nuts)	Toxin uncertain. Inflammation of mucous membranes, stupor and paralysis.
Juniper (Savin) (<i>Juniperus sabina</i>)	all parts	Contain oil of sabinol. Irritation of nervous system.
Oak (<i>Quercus species</i>)	foliage, acorns	Large amounts can affect kidneys. Usually takes several weeks.
Privet (<i>Ligustrum species</i>)	leaves, fruit	Contain several toxic glucosides and alkaloids. Causes digestive upset and nervous reactions.
Snowberry (<i>Symphoricarpos racemosus</i>)	fruit	Contain loturidine, a strong alkaloid. Digestive upset.
Tree-of-Heaven (<i>Ailanthus altissima</i>)	bark, roots	Toxin produces jaundice, gastro-intestinal and urinary tract disturbances.
Yew (<i>Taxus species</i>)	all parts except fleshy red plup of fruit	Contains a strong alkaloid, toxin and formic acid. Death may be sudden preceded by convulsions.

Non-cultivated Plants in the Wild

Baneberry (<i>Actaea rubra</i> <i>A. alba</i> and <i>A. pachypoda</i>) <i>A. rubia</i> is common along streams in Colorado. Red Fruit is attractive and looks edible.	all parts	Toxin is an oil which is a violent purgative.
Jimson weed or Thornapple (<i>Datura stramonium</i>)	all parts	Contain atropine and other strong alkaloids. Delirium coma. Death may follow.
Nightshade (woody) (<i>Solanum dulcamara</i>)	all parts	Contain solanine, dulcamarine and other alkaloids. Causes cerebral disturbances.

<i>Plant</i>	<i>Toxic Part</i>	<i>Toxic Substance and Symptoms</i>
Nightshade (black) (<i>Solanum nigrum</i>)	leaves and green fruit. Ripe fruit is edible if cooked.	Contains same type of alkaloids as in woody nightshade but less severe.
Poison hemlock (<i>Conium maculatum</i>) A common parsley-or carrot-like plant in wet places.	all parts	Contains conine and related materials. It is said that Socrates was executed with this poison. Leaves often mistaken for parsley. Death usually results from lung paralysis.

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Crabapple Announcement

The Helen Fowler Library has just received a copy of a book issued by the United States National Arboretum, Washington, D.C., entitled *History, Progeny and Locations of Crabapples of Documented Authentic Origin*. This is the second of their irregular series entitled *National Arboretum Contribution No. 2*.

The book of 107 pages, was written and compiled by Roland M. Jefferson, Botanist at The U.S. National Arboretum. It is the most documented treatment of cultivated crabapples — with botanical species, varieties and cultivars — that has ever been published. This book has been needed for a long time and is a much welcomed help for the propagator and nurseryman.

In addition to detailed notations of origin and source, the work also includes general morphological descriptions, current source locations and genealogical formulae of clones of hybrid origin.

Copies of the booklet are available to botanists and horticulturists by writing to Roland M. Jefferson at the U.S. National Arboretum, Washington, D.C. 20002.

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This is a non-profit organization supported by municipal and private funds.

A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden center around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

AUTUMN 1970



THE COVER

Bauhinia blakeana Dunn

Leguminosae

Boettcher Memorial Conservatory

Hong Kong Orchid

Transparency by D. A. Blades

Flowers are reddish to rose-purple, 5½-6" across, said to be the most beautiful in the genus, seems to be a natural sterile hybrid, named for Sir Henry and Lady Blake commemorating their kindly interest in Hong Kong Botanical Gardens during his governorship.

THE GREEN THUMB

VOL. TWENTY-SEVEN, NUMBER FOUR

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DAVID A. BLADES, *Editor*

AUTUMN 1970

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By becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the use of the books in the Helen K. Fowler Library at Botanic Gardens House.

For further information write to Membership Chairman, Botanic Gardens House, 909 York Street, Denver, Colo. 80206, or call 297-2547.

NEEDED:

Positive Approach to Landscape Planting in Metropolitan Denver

E. ALAN ROLLINGER, L.D.

LANDSCAPE planting in Colorado has gone from what is possible to what is not possible. Early residents planted trees which they had known before their immigration to the Denver area. There was no one to tell them what would grow and what would not grow here.

Homes, streets, parks, civic buildings, schools, and cemeteries were planted with a wide variety of trees. In addition to what are now considered hardy species, namely cottonwood, locust, ash, soft maple, and elm; such trees as oak, buckeye, Eastern White Pine, sycamore, and hard maple to name only a few were planted. Through trial and error a sizeable number of these unusual trees were established, and today those surviving trees are evidence of the positive approach these early settlers had toward horticulture in this area as well as evidence of the adaptability of individual trees.

Anyone interested in what trees are growing here rather than what trees are usually recommended will discover fine specimens of a wide range of trees. As result of a recently completed survey

conducted by the author, a large number of these trees have been located and recorded.

Residents in Metropolitan Denver are no doubt aware that oak trees are growing here; however, I doubt that many people realize the number and variety of oak species that have adjusted to our climate and are thriving. To date eleven separate species (excluding the native Gambel Oak) are to be seen here. Of the eleven varieties those with the largest number of trees are Bur Oak and Northern Red Oak. Specimens of two feet or more caliper are not uncommon.

When discussing large oaks in this area the "brown" oaks located on South Federal at Stanford must be mentioned first. Named for an early settler on whose farm they were planted, these fine old Bur Oaks having calipers up to four feet are to my knowledge the largest and oldest examples of this species in Colorado.

Northern Red Oaks are to be found at the northwest corner of Washington Park. The park adjacent to the Decker Library at South Logan and Florida



Bur Oak, *Quercus macrocarpa* Michx.
Near S. Federal Blvd.,
48-inch trunk diameter.



English Oak, *Quercus robur* L.
Fairmount Cemetery, East Denver,
38-inch trunk diameter.



Copper Beech, *Fagus sylvatica atropurpurea* Kirchn.
East Third Ave., Denver,
22-inch trunk diameter.



Yellow Buckeye, *Aesculus
octandra* Marsh.
Washington Park,
30-inch trunk diameter.

Between applications of plant food, leach away harmful salts by standing house plants in the sink and watering them copiously at the soil surface until water runs freely from the drainage hole. The clay pot is a safeguard against overfeeding, since excess plant food and harmful fertilizer salts can escape through the breathing pores in pot walls as well as through the drain hole.

boasts another fine specimen. Noteworthy is a giant Red Oak in the north Denver area at 4001 West 30th Avenue thought to have been planted before the turn of the century.

One of the most unusual trees growing in this area is the European Beech. The largest of these is located at 1333 East Third Avenue. This particular tree was brought to Denver approximately fifty years ago by its owner.

Several places in Metropolitan Denver are rich in varieties of unusual trees. In addition to City Park already known for its trees, Washington Park contains many species. Noteworthy are the buckeyes near the old Eugene Field home; and the Kentucky Coffee trees within the park opposite Tennessee and South Franklin Streets.

Fairmount Cemetery has a high density of unusual trees. Among these are eight species of oak including some of the finest examples of English Oak in Metropolitan Denver. Also sycamores and a number of very old Norway Maples are to be seen here.

Some observations should be made about the effects of the infamous October 1969 freeze on these trees. It appears that damage and loss are no greater among these than among the more commonly recommended varieties of trees. In fact the freeze seems to have caused more severe damage to the more widely planted Siberian Elm, Weeping Willow, and some species of poplar than to these.

Unfortunately, landscape planting in Colorado through the years seems to have gone from the positive to the negative. To return to the positive approach we in Metropolitan Denver should consider planting a wider variety of trees than those commonly recommended.

Low Shrubs for Colorado Landscaping

GEORGE W. KELLY*

NATIVE BROADLEAF EVERGREENS

Arctostaphylos patula, MANZANITA. Evergreen leaves, polished bronze stems and black fruit. Two feet or so high. Difficult to plant.

Arctostaphylos uva-ursi, KINNIKINNICK. Low mat plant with small evergreen leaves and red berries. A good ground cover.

Berberis repens (*Mahonia*), OREGON GRAPE. A good evergreen ground cover. Yellow flowers, blue fruit, leaves green in shade and red in sun.

Ceanothus velutinus, MOUNTAIN BALM. A beautiful evergreen with thick, resinous, fragrant leaves and heads of small white flowers. Difficult to transplant.

Yucca sp. SOAPWEED. Several varieties are native and all are most useful for their evergreen leaves and spectacular flower stems.

LOW NATIVE MOUNTAIN SHRUBS

Ceanothus fendleri, NEW JERSEY TEA. A low spreading shrub with partly evergreen leaves and heads of small white flowers. A little difficult to transplant.

Rubus parviflorus, SALMONBERRY. Very large attractive leaves, white flowers and edible raspberries. For a moist, shady place.

Rubus strigosus, WILD RED RASPBERRY. Grows in loose soil in sunny places, delicious berries.

Pachystima myrsinites, MOUNTAIN LOVER. This delightful little shrub is not as well known as it justifies. It has evergreen foliage resembling boxwood and grows in well-drained, shady spots.

ED. NOTE. Cl indicates a Clone or horticultural development and sp. indicates various species. Mr. Kelly suggests that some of the plants in the original list and those in the supplementary list may be difficult to find in nurseries.

NATIVE DESERT SHRUBS

Artemisia sp. SAGE. Several woody sage shrubs of small size might be used in dry places. All have fine gray foliage and may be quite attractive.

Atriplex sp. SALTBUUSH. Several of the desert saltbushes are low enough to classify here. They will grow with little water or care and may be quite attractive.

Chrysothamnus sp. RABBITBRUSH. The common rabbitbrush is too tall to be included here but there are several species that grow only a couple of feet tall with ornamental green-gray stems and yellow flowers in fall.

Eriogonum sp. BUCKWHEAT. Numerous species of buckwheat grow in Colorado and several of them are partly woody. They are all low and have heads of very small, attractive bloom.

Eurotia lanata, WINTERFAT. This shrub appears white-wooly, but grows a little taller than horsebrush.

Forsellesia sp. GREASEBUSH. Very small but numerous green leaves and a naturally compact, rounded shape. Could be very useful in a Japanese garden. *Leptodactylon pungens* and others, FALSE JUNIPER. A very low plant with fine evergreen foliage similar to juniper. Blooms in spring, resembles creeping phlox. Could make an interesting ornamental.

Quercus undulata, DESERT OAK. This little oak usually stays under a foot high. It spreads and makes mats of short stems with acorns and fall color like its larger relatives.

Tetradymia sp. HORSEBRUSH. There are two species that are low, attractive and appear to be covered with gray wool.

VINES

Clematis sp. The native white clematis is a vigorous vine which may grow over the ground like a shrub. It bears white, star-like flowers in summer. The yellow oriental species has naturalized itself along the streams and highways near Idaho Springs.

Parthenocissus vitacea, WOODBINE. This common vine may make an attractive ground cover in summer and displays brilliant fall color.

Vitis vulpina, WILD GRAPE. May climb over shrubs or creep over the ground and makes attractive ground cover along streams.

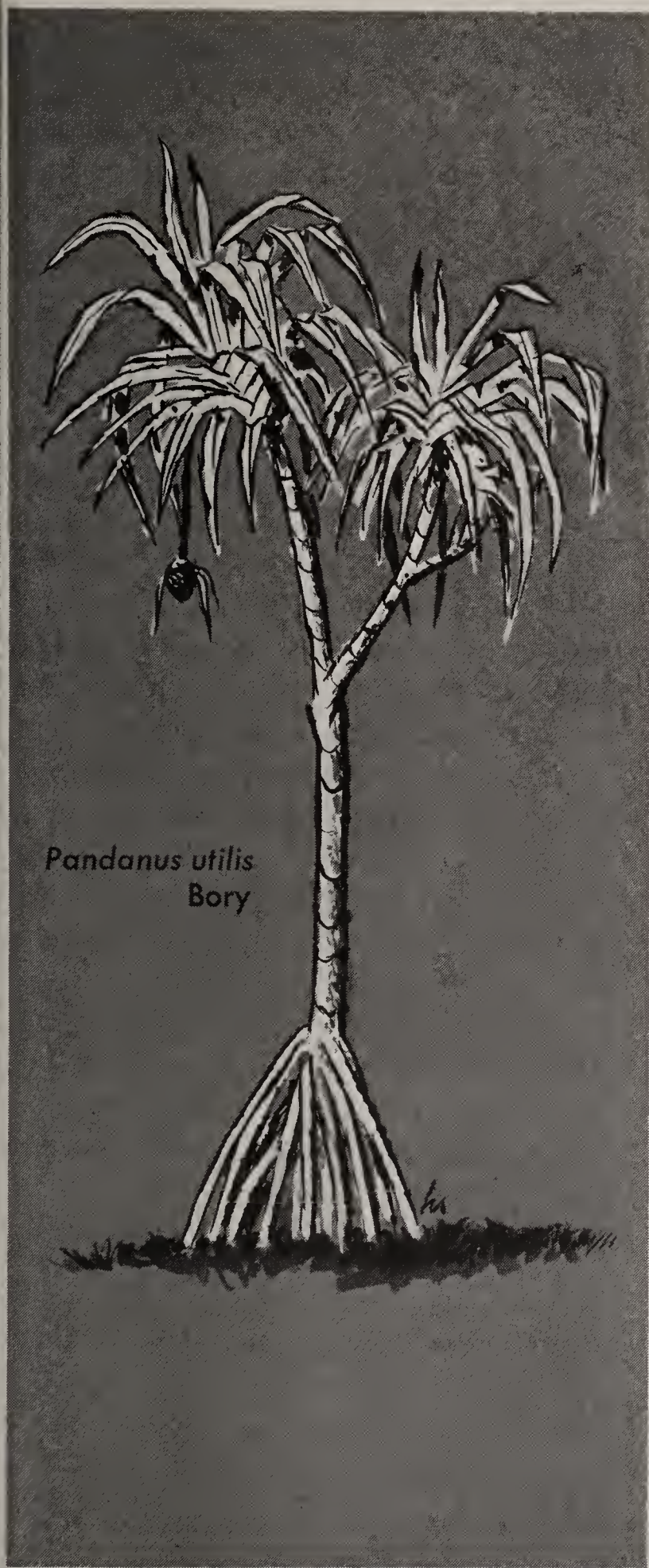
* Mr. Kelly, it has been written, "is one of those rare individuals who has become almost a legend in his own lifetime because of his love for, and knowledge of, horticulture." A nurseryman for many years, he was one of the founders of the Colorado Forestry and Horticulture Association, was its first director and editor of *The Green Thumb* magazine for 12 years. In fact, as its principal contributor he used much of his material published here in his first book called "Rocky Mountain Horticulture Is Different," the original book on gardening in this area. Later revised and indexed the book appeared as "Good Gardens in the Sunshine States" and is now available as "Rocky Mountain Horticulture." While director at Horticulture House he worked hard for establishment of a botanic garden.

Always dedicated and enthusiastic in the furtherance of gardening in this area he taught and continues to teach landscaping classes for homeowners and gives countless talks wherever invited. He originated the Green Thumb radio program and later created the first Denver television programs on gardening in cooperation with C.F. & H.A. and the Colorado Nurserymen's Association. A dedicated conservationist, he has crusaded for state and national parks, conservation, a botanic garden and the botanical garden outpost on Mt. Goliath, which was established in cooperation with the U. S. Forest Service. He was an early advocate of the use of native plants in landscaping home grounds, public parks and roadside developments. At his Cottonwood Garden Shop he promoted choice plants for particular gardeners and offered sympathy and encouragement to inexperienced ones.

An early participant and backer of the Colorado Garden Show he continues to serve the present organization as coordinator of horticultural displays. He has been landscape consultant for the Air Academy, Martin Company, Marathon Oil and the Colorado Department of Highways. A member of numerous plant societies and conservation groups he is recipient of the Johnny Appleseed award given nationally by the Men's Garden Clubs, was named Nurseryman of the Year by the Colorado Nurserymen's Association and was named Man of the Year by the Chamber of Commerce at Cortez, Colorado — his home since "retirement."

An ardent naturalist he has discovered at least a dozen plants in recent months not previously recorded by Dr. H. D. Harrington at Colorado State University. He continues to write for various local and national newspapers and periodicals. A man of limitless enthusiasm and energy he responded immediately when asked to revise or bring up-to-date his article "Low Shrubs for Colorado Landscapes," originally published in the October 1948 issue of *The Green Thumb* and reprinted here with supplemental lists in commemoration of the magazine's twenty-fifth anniversary.

* Mr. Kelly's newest book, *Woody Plants of Colorado*, is a recent publication of Pruett Press, Boulder, Colo. It is available in the Helen Fowler Library and at Botanic Gardens Gift Shop. Long-time editor of *The Green Thumb* magazine, Mr. Kelly is also author of *Rocky Mountain Horticulture*, now in its third edition.



Focus
on
Pandanus
in the
Boettcher
Memorial
Conservatory

PEG HAYWARD

Pandanus L., screwpines, comprise a curious group of tropical ornamental foliage plants. A maturing specimen is picturesque with its unusual branching

and stilt-like roots. *Pandanaceae* is an Old World family consisting of only two genera, *Pandanus* being the only one which contains trees. Morphologi-

cal evidence suggests that these trees are more primitive than palms. They are the only monocotyledons that offer palms serious competition in the struggle for growing space. Screwpines are widely distributed, being native to tropical Asia, Indian Ocean islands, Polynesia, and Africa.

The derivation of *Pandanus* is from *pandang*, a Malayan word meaning conspicuous. The name screwpine comes from the fact that the leaves are arranged in spirals and the fruits and foliage resemble those of pineapple. In Hawaii these plants are commonly referred to as "tourist pineapple" by the tour drivers because of this resemblance of the ripened yellow fruits to pineapples growing in trees.

Many *Pandanus* are low and bushy but some are tall trees with many-branched trunks. In their native regions some kinds grow 60 feet in height. When mature, these awkward looking trees are usually supplied with characteristic prop roots and the trunks are conspicuously ringed with horizontal leaf scars. The aerial roots originate well up on the trunk and appear to be lifting the tree from the soil. They act as props to reduce the danger of plants being blown down in storms and provide escape from overflows in lowlands. The stout, scaffold-like branches are clothed from the tips back with handsome spirally-arranged leaves. These branches often divide in pairs forming a series of ascending Y's. The ribbon-like leaves, bluish-green with linear sharp teeth along their margins, are sessile without leafstalks. Each leaf clasps the stem at its base, then tapers gradually to a point, with a strong keel

below matched by a groove above, making an open V in cross section.

Each tree is either male or female, but in each case the flowers are densely clustered. The staminate inflorescence is a drooping, frosty plume of hundreds of tiny flowers, which are loaded with pollen, partially enclosed in a long, whitish bract. Fruits of the female tree are large, globose and woody like a cone. They are the composite product of many flowers each of which contributes one fleshy part with a central armored seed. Its fibrous, prismatic sections, or drupes, become yellow as they ripen, then separate and fall. The orange-red pulp surrounding the individual parts of the fruits is safe to eat. The seeds, even though difficult to extract, are well flavored and may be eaten in any quantity. Also, the tender growing tips of "cabbabe" deeply buried in the terminal parts of the leafy branches are crisp and may be eaten raw or cooked. When no fresh drinking water is available, small quantities of moisture may be had by chewing the tips of the prop roots.

The tough pliable leaves of *Pandanus* are plaited into mats, baskets, hats, fans, sandals and other useful articles. From the fragrant flowers of some species perfumes and native medicines are prepared. The roots yield fiber for cord.

There are over 200 known species of *Pandanus*. Two species may be observed in the Boettcher Memorial Conservatory. *Pandanus utilis* Bory, native of Madagascar, is one of the tallest kinds and its leaf spines are red. *Pandanus veitchi* Dall. from Polynesia has attractive white-banded leaves and is a popular house and florist plant.

The Need for a

COLORADO ARBORETUM

F.L.S. O'ROURKE, *Horticulturist*

THE GENERAL concept of an arboretum is an extensive area (500 acres or more) where woody plants are grown for determining climatic adaptation, growth response, observation, demonstration, scientific study, beauty, and just plain enjoyment. There is no such facility in Colorado. In fact, there is no really functional arboretum between Chicago and San Francisco.

The East, Midwest, and Far West are well supplied with arboreta but the distance and climatic variations render them of little value to Colorado. Climatic analogs may indicate that certain plants should thrive in other localities but the environmental complex is usually so great that the only way to actually determine plant adaptation is to grow the plant in a local site under constant and controlled observation.

Where arboreta have been established over a period of time they are recognized as a basic source of information for the analyses of arboricultural problems. A large number of professions and industries rely upon such information to guide them in the conduct of their various endeavors. Nurserymen, landscape horticulturists and architects, landscape contractors,

maintenance operators, spraymen and arborists keep in close contact with arboreta to observe plant adaptation and the effects of various methods and cultural treatments. They also use the facility to demonstrate the relative merits of specific trees and shrubs to their clients and customers.

The establishment and scientific management of an arboretum is a specialized phase of horticulture. All the factors of growth and development of various trees and shrubs are studied under various site conditions and occasionally under controlled environments.

Educational institutions which teach botany and do research in the plant sciences rely upon the arboretum as an outdoor laboratory. The ecologist has the opportunity to study and report the various effects of the environment, the taxonomist may study the morphological features of plants and interpret the systems of classification, the physiologist the influences that affect biochemical reactions, and the pathologist the differences in response to diseases and the abnormal influences of the environment.

The geneticist and plant breeder considers an arboretum of prime impor-

tance. It constitutes a "bank" where various types of germplasm may be stored in living plants for future hybridization and it furnishes an area to observe the response of hybrids and other selections under relative uniform conditions.

An arboretum attracts wildlife. The variety of food and shelter furnished by trees and shrubs in the relative tranquility of the area make it an ideal habitat for birds and small mammals. Ornithologists, birdwatchers, and nature-study groups find that the grounds of an arboretum are ideal for study purposes. It serves as a laboratory to both the conservationist and the naturalist.

Likewise, teachers of science and nature-studies find in an arboretum the resources they require in instructing students and most of all, in instilling in their being the love of nature and awareness of ecological harmony that is so important in the lives of modern citizens.

There is a segment of the general public which prefers what has been termed "meditative recreation" to more strenuous pursuits. In the arboretum such persons may relax amid the tranquility of the trees, listen to the soft undertones of the living environment, and depart refreshed in body and spirit. To others the arboretum is a place of natural beauty where they may admire the flowers in spring, the deep shadows in summer, the brilliant foliage in autumn, and the stark silhouettes of the trees in winter. The York Street headquarters of the Denver Botanic Gardens will provide many of these amenities with the fulfillment of the current development plans but the need for the broader area concept of an arboretum will still remain.

The need, then, for a Colorado Ar-

boretum is apparent. On a long term basis it is the only way to implement testing, trial, development, and distribution of woody plants specially suited to the high plains region. Outstanding individual trees and shrubs which have a long history of good performance in this region can be vegetatively propagated and the resulting clone planted out for further controlled evaluation, development and distribution. Further, these plants together with new species and clones growing in the arboretum may be used as a basis of a plant breeding program specifically designed to develop plants of proven merit for our unique climatic conditions. The results of such a program can be an entirely "new" group of plants for Colorado gardens, parks and roadsides.

The need for a Colorado Arboretum is evident but there are other worthy projects which absorb the mind and attention of people. A sufficient number of persons must be convinced that an arboretum in Colorado should have a high priority before it can become a reality. Concerted efforts must be made to popularize the arboretum concept.

In several states interested citizens have formed groups known as "Friends of the Arboretum" and "Arboretum Associates," in order to stimulate interest and secure financial support. In other states a sponsoring organization has been formed and incorporated before land was obtained. Apparently the land became available soon after.

Could not Colorado do likewise? Is a Colorado Arboretum just a dream? Can we not enlist the interest and financial support of enough Coloradans to make the dream an actuality? Should the Denver Botanic Gardens not assume the responsibility of spearheading such a development?

Chatfield Arboretum

WAYNE G. CHRISTIAN

CHATFIELD DAM, approximately 15 miles southwest of the State Capitol Building, was authorized in 1950, after extensive studies by the Army Corps of Engineers. Unfortunately, at that time, too few people were concerned to encourage Congress to appropriate the necessary construction funds. The serious flood of June 16, 1965, provided the "push" that aroused public interest to the point that many importuned Congress to act favorably. While construction funds have been curtailed part of the time the project is well under way and should be completed within three more years.

The flood, that summer day, also opened the eyes of many of Metropolitan Denver's citizens to the fact that the Platte, and its tributaries, wonderful potential assets for learning and recreation, were being so damaged by misuse that repair would be costly and difficult. That belated awareness was translated into action by various groups, both private and public, and thus the stage was set for efforts to be made to obtain lands west of Highway 75, on the drainage of Deer Creek for Denver Botanic Gardens to develop a satellite station: specifically an Arboretum and, as a part of it, a Demonstration Farm and an Ecological Study Center.

After several conversations and communications with representatives of the Army Corps of Engineers — instigated

by members of the citizens committee which the Corps helped to establish to study problems related to flood control and land use — the Botanic Gardens Board authorized a formal letter of request to the Corps for the setting aside of nearly 500 acres for an arboretum, demonstration farm and ecological study center.

The prime function of the arboretum is to be the care and development of native plants and the study of exotic plants which might be adapted or adaptable to climatic conditions existing in that part of Colorado. The site is an excellent natural one for such studies since life zones ranging from prairie grass-lands to the montane zone are either on the land or immediately adjacent.

Members of the Botanic Gardens Education Committee worked out an abbreviated "master-plan" which was submitted to the Corps of Engineers earlier this year. While many modifications will probably be necessary it is expected that that plan will be the nucleus from which the final plan will evolve.

The plan envisions a multi-use facility, in keeping with modern concepts of land utilization. Changing atmospheric conditions in crowded urban centers are affecting natural vegetation as well as imported ornamentals. It should be one of Denver Botanic Gardens goals to seek ways to

combat this unwanted deterioration of our environment. In addition to strictly utilitarian values, such as that just mentioned, there should be areas devoted to scientific studies that may not reach fruition for a half century or more. Too, the site is well suited for ecological research and its close proximity to a major population center which expects to have, in a few years, a college and graduate school population of 100,000 makes it an ideal facility for long range studies for many students. Some educators and scientists have dreamed of the day when the colleges and universities of the metro area will combine certain of their research and teaching facilities to establish a School of Ecology second to none.

Presently on the grounds is a complete farm complex that can well serve as the headquarters for many years without extensive rebuilding or remodeling. Too, the farm buildings will become important parts of the overall plan which envisions a small working farm to demonstrate to urban children actual farm life conditions. Children, in small groups, would be encouraged to work on the farm for brief periods of time. This would in no way compete with the City Zoo's Children's Farm since that unit makes no pretense of being a functional operation.

Slight modifications of existing buildings would make it possible for small groups of graduate students to live-in during the summer, or other times, to carry on their studies — to the mutual benefit of the arboretum and the students.

The Denver Water Board has already agreed to provide sufficient water at reasonable rates for the long-range development of the site. The present wells will serve the area for a time, for human consumption needs, but will not

be capable of being pumped heavily for irrigation.

Along the west side of Highway 75 there are a series of odd-shaped pieces of property owned by the Government — lands which the highway did not need for right-of-way. It is proposed that those parcels be utilized to demonstrate, with the cooperation of various state and federal agencies, what can be done for highway beautification using native drought-resistant plants.

Above the flood line of the property it is proposed that greenhouses be constructed and test plots established. Test plots in such a protected location could be used for carefully planned scientific studies over the years.

A one-room frame school house (now being used as a private dwelling) is on the property and it is hoped that it can be preserved and with the help of the Historical Society or other interested groups or individuals restored for its historical value. While this may seem removed from the conventional aspects of a botanical garden or arboretum it does represent an early day educational institution and should be retained for the benefit of the school children who will use the area in years to come. It would be possible to preserve and use the structure without expensive on-duty guards since it would be within the grounds of the arboretum and not left unprotected.

Recreational factors will not be overlooked. Along the lower portion of the property a bridle path could be established without disturbing the planted areas. Through the remainder of the site, motor traffic will be restricted to the main parking area and guests will be permitted to walk over the grounds along defined trails. Control will be needed over the location of trails to protect the animals still living in the area (such as deer, raccoons and small

rodents as well as many species of birds).

The entire operation will endeavor to protect existing plants and animals and permit maximum feasible use by interested individuals. With Greater Denver's population expected to pass the two million mark before the end of this century the need for open space will be greater than ever. Space for tomorrow must be set aside today.

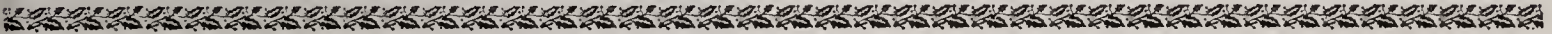
It is not intended that the use of the facilities would be restricted to Denver Area citizens, but will be open to the general public whether local or tourists. The land will remain the property of the U.S. Government and will be administered by the State Game, Fish and Parks Department which in turn will assign the land to the Botanic Gardens under the terms of a long-time use lease.

The site could well serve as the headquarters for nature study programs

using adjacent lands, both private and public. That development will await the establishment, by the Botanic Gardens, of an education unit headed by a qualified person who will direct his full attention to the educational aspects of the various units of the gardens. (At first a caretaker-farmer could be employed.)

The Gardens already are uniquely endowed with educational facilities under their ownership or control — a site above Evergreen, Mt. Goliath near Mt. Evans, the Pinetum in City Park. Think what can be done in the future with the development of lands at Chatfield Dam and other sites now available if constant efforts are expanded!!

In the past far-sighted members of the Board of Directors have pointed the way — it is my firm conviction that the present and future boards will be no less eager to make these plans a reality.



Give a Membership to a Friend for Christmas...

DENVER BOTANIC GARDENS
909 York Street, Denver, Colorado 80206

I hereby apply for membership in the Denver Botanic Gardens ☐

I wish my membership in the Denver Botanic Gardens extended ☐

Enclosed is \$_____ for my annual dues.

Class of Membership desired: (check one)

- | | | | |
|--|----------|---|---------|
| <input type="checkbox"/> Regular | \$ 5.00 | <input type="checkbox"/> Supporting | \$25.00 |
| <input type="checkbox"/> Participating | \$10.00 | <input type="checkbox"/> Contributing | \$50.00 |
| <input type="checkbox"/> Sustaining | \$100.00 | | |

Name_____		
Address_____		
City_____	State_____	Zip Code_____

Denver

Loses

Mike Ulaski

FRANCES NOVITT

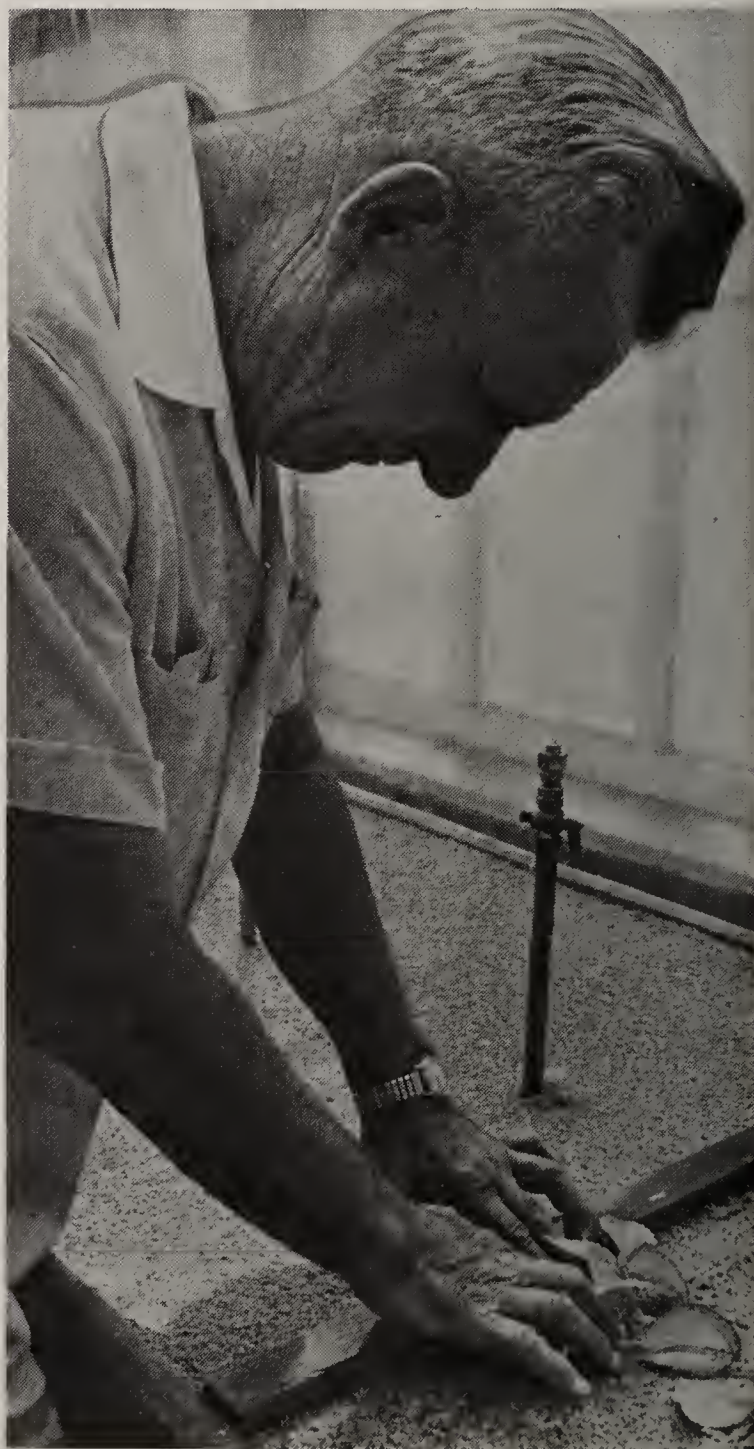
JULY 16, 1970 marked the passing of one of the best plantsmen in this part of the country. Mike Ulaski died suddenly of a heart attack while at work as superintendent of Denver's City Park Greenhouses.

Mike came to the Denver Parks Department in 1949 and by 1957 had taken charge of the City Park Greenhouses. He had been overseer of the colorful displays at Elitch Gardens. At City Park, he directed a large and complex operation which produces over 200,000 annuals and perennial flowering plants for the gardens in the city parks and the Denver Botanic Gardens on York Street. These colorful displays contribute much to Denver's reputation for beauty.

He was one of very few men today who had the highly technical knowledge required to grow a great variety of flowering and foliage plants by various methods of propagation. He also had rare interest and enthusiasm for his work. He enjoyed meeting the challenge of propagating and growing an unusual or otherwise unavailable variety of plants for use in our parks.

He was very aware of the need for more interest, trials and experimentation with untried plant varieties here in the Rocky Mountain area. He was also aware of the widespread need for more trained men in this field. He contributed much of his own time and effort toward the training of those interested in horticulture and floriculture.

Mike took charge of the greenhouses and they soon reflected his way of doing things. The buildings themselves were amazingly clean and neat, as were the careful methods, complete records,



Mike Ulaski

and conscientious follow-through which he and his men carried out.

Mike was a charter member of the Men's Garden Club of Denver, some 25 to 30 years ago. He was always an active member, and served as president in 1966. He was a member of an organization now called the National Recreation and Park Association, and took an active role for many years in its Southwest Training Institute programs. He was one of the few active members in this area of the International Society of Plant Propagators. He did attend the Field Days of the George Ball Seed Company in West Chicago, where there are trial gardens displaying the newest and best flowers.

He took his vacations to attend meetings of these professional groups,

and his hobby of photography was used to help his work. His beautiful pictures were often incorporated into the talks he gave about plants and how to grow and maintain them.

He was a friendly, helpful man who was always willing to talk over a plant problem and recommend a treatment.

One of the last new flower displays established while superintendent is the new bed at the corner of 14th and Bannock Streets in the Civic Center. It shows the figure '76, and the five inter-linked circles from the Olympic symbol. It was planned too late in the season to have plants grown especially for it and had to be filled somehow with plants already on hand. That its complicated design was rendered so well reflects much credit on Mike.

AMUR HONEYSUCKLE

SUZANNE ASH

ESTABLISHING boundaries and privacy are only two of the problems that confront the new homeowner, but they are very important ones for the enjoyment of a new home.

In attempting to solve these problems I was led to some interesting shrub research and the ultimate discovery of a plant new to me. Hedges, unfortunately, can take many years to make any significant growth in our Colorado climate and poor soil. Too, they can be expensive. Two widely used hedge plants, Russian olive and Tatarian honeysuckle, were unsatisfac-

tory to me. A large acreage of Russian olive presents no problems, but on an average lot with small children it often becomes overgrown and can be a menace to children. Both Tatarian honeysuckle and Zabel's honeysuckle grow too leggy as a hedge. After a good display in spring their foliage becomes rather dull.

Here are the requirements hedging material should possess for my landscaping purposes:

1. Good root system, holds slope well.



About ½ actual size

2. Branches well, doesn't require shearing, doesn't get leggy.
3. Insect free.
4. Good foliage, texture, color.
5. Holds leaves in fall.
6. Fast natural growth.
7. Hardy and able to withstand drought.
8. Minimum breakage in wind and snow.
9. Relative low cost.

After consulting George Kelly's *Good Gardens in the Sunshine States* I decided to try *Lonicera maackii* Maxim., Amur or Late Honeysuckle, but finding a source proved very difficult. An outlet in Missouri listed a hedging grade of *Lonicera maackii podocarpa* Rehd. I discounted the catalogue's glowing description and ordered the 100 plants needed.

Trials at two new gardens over a 10-year period proved that this species deserves wider use and the glowing description. An honest recommendation for Amur honeysuckle can be found in the U.S. Department of Agriculture Farmer's Bulletin #2105, *Ornamental Hedges for the Northern Great Plains*: "Amur honeysuckle is hardy and drought-resistant. It has dark green foliage that does not assume the dull color in midsummer that is so often found in varieties of Tatarian honeysuckle. Its bloom consists of rather coarse, large white flowers. Its red fruits persist to mid-winter. It attains a height of 6 to 9 feet and a spread of 6 to 7 feet. Because of its comparatively large size, it is suggested that it be grown in the untrimmed form. One noticeable characteristic of Amur honeysuckle is the very rapid growth of the young plants."

This rapid growth of Amur honeysuckle is not exaggerated. Newly planted shrubs grow in thickness as well as height. In one year 15-18 inch rooted cuttings grew to a bushy 3½ feet and in two years to a dense 7 feet. They received only natural rainfall and water from the adjacent lawn. On a sloping area with only natural rainfall it grew to a branched 4 feet in two years. Other advantages are: it remains attractive in the fall and suffers minimum breakage during heavy snows. Planted without care at about 2½ feet apart these shrubs do fantastically on their own. Loss was only about 10 per cent of all planted.

Amur honeysuckle can be of real value to the suburban homeowner who wishes to define the boundaries of his property and gain privacy at a moderate cost. Those with established landscaping will also find this shrub quick to replace a hedge that has outlived its usefulness. I hope you will try it.

MORE

ON THE FREEZE

DR. JAMES R. FEUCHT
Extension Associate Horticulturist

IN THE WINTER issue of *Green Thumb*, Vol. 27, No. 1 (Pp. 30-31), appeared an initial summary of the freeze damage which occurred as a result of last October's storm. At that time most of the observations had to be based upon speculation because it was difficult to see the full extent of the storm damage. We are now in a better position to really see what happened.

While the damage from the freeze varied considerably from one area to the next, there is no doubt that the extent of the damage is considerable. It is of a greater magnitude than any similar event in the past.

Introduced Species Hurt Most

General observations in the Greater Denver Area as well as in Colorado Springs, Pueblo and Fort Collins, show that the most severe damage occurred to the Siberian (Chinese) elm, *Ulmus pumila* L., various forms of the weeping willow, *Salix blanda* Anders. the golden weeping willow, *S. alba vitellina*, (L.) Stokes and also the shrubby goat willow, *S. caprea*, L. Also showing varying degrees of injury were certain types of cottonwoods, primarily the introduced varieties and clones such as Carolina poplar, *Populus canadensis eugenei* Moench, and the selections of *Populus nigra* L. such as the Lombardy poplar.

It is interesting to note that little or

no damage has occurred to the native willow, *Salix amygdaloides* Anders. and the native plains cottonwood, *Populus sargentii* Dode.

Injury to soft or silver maples, *Acer saccharinum* L. was most severe in trees which were less than 10 inch caliper. Many of these were frozen to near the ground level. In larger trees, some in excess of 50 feet in height, damage was confined to the upper branches. This is what we are now seeing as a stag-horn or a dieback condition. In many cases it has been observed that the damage occurred primarily to the bark tissues on the lower sides of the branches, and on closer examination one can find a narrow strip of healthy bark on the upper portion of the branch. This is apparently a result of protection from the heavy snow which covered the branches at the time of the freeze. A similar type of damage has been observed in some of the more vigorous specimens of American elm, *Ulmus americana* L., and in some green ash, *Fraxinus pennsylvanica lanceolata* (Borkh.) Sarg.

Branches Still Wilting

Many trees continued to show sudden wilting of branches even though they resumed growth in the spring in an apparently normal manner. The more severely frozen branches failed to resume growth at all. Others wilted

soon after growth began in the spring and still others continued to develop apparently normal foliage only to wilt as hot weather continued.

Close examination of branches which resumed normal growth in spring and wilted later reveals a clear picture as to what happened. A cross-section of a branch will show that only a small portion of the upper part of the branch contains living cells. In many cases it will be found that wound callous is forming from that portion of the branch which still had active cambium. There were sufficient live tissues in the branch to maintain growth until a point was reached where the total foliage surface was completely out of balance with the amount of vascular system needed to support this foliage with water and nutrients. Thus the foliage wilts.

Branches which had only small amounts of freeze damage are in general showing satisfactory recovery. Small hairline cracks caused by the freeze and not visible earlier in the year are now showing up. From these small hairline cracks have developed massive amounts of callous or wound healing tissues. In one case observed, a golden raintree, *Koelreuteria paniculata* Laxm., there were so many ridges of callous tissue forming on the main trunk that the plant took on the appearance of a cylinder of corrugated cardboard.

Some Surprises

Earlier in the year many observers predicted that there would be massive losses to such species as the Newport plum, *Prunus* 'Newport,' several of the domestic cherries and peaches. The extent of the damage to these plants is not as severe as was once thought. This varied from one location in the metropolitan area to the next, however. In some places it was difficult to find a peach, cherry or plum that was not

damaged or killed. In other areas fruit trees showed no damage at all or, at worst, some minor dieback of side branches. It is believed that air drainage patterns were responsible for the variations in damage throughout the metropolitan area. Some of the most severe damage occurred in low-lying areas, particularly in southeast Denver.

A surprising amount of freeze damage occurred to the black walnut, *Juglans nigra* L., even in large mature trees. While the black walnut has long been considered a fairly hardy species in this area, it does have a tendency to grow rapidly late in the season and thus may occasionally have tender shoots which would be subject to freeze injury even in more "normal" years.

Hardiness Not Necessarily a Factor

The reported cold hardiness of a plant did not seem to be a major factor in the ability of the given species to survive the October freeze. For example, the Siberian (Chinese) elm is rated for Zone 4 hardiness, which means that it is capable of taking temperatures as low as minus 20° Fahrenheit. Yet it has been estimated that greater than 75% of this species were severely damaged in the freeze and in some areas as high as 90% were frozen near to the ground level and not worth salvage. On the other hand, a more tender species such as the golden raintree, rated in Zone 5, and growing in the same area where severe damage to Siberian elms occurred, often escaped with little or no damage.

Trees which were in high vigor as a result of excessive amounts of fertilizer or an ample water supply at the time of the October freeze, were in general more severely damaged than those that were in drier soil and had been more or less neglected during the growing season.

Damage Severe in Evergreens

The amount of freeze damage to many evergreens was of sufficient magnitude to render many of them useless. Others will be so deformed that they will never regain the same shape they once had.

Many of the pines, including ponderosa, pinyon, bristlecone and Austrian, lost entire tops or, in some cases, one side. This is an almost irreparable loss because needled evergreens rarely, if ever, replace lost branches. If they do, it is very slow.

In some cases blue spruce and Douglas fir also sustained damage. Many are showing remarkable recovery from some of the lateral buds which were apparently not damaged. In others, however, no regrowth has occurred.

In cases such as spruce, where the main leader has been damaged, it is advisable, particularly in smaller trees where the top can be reached, to train a new tip from the closest and strongest lateral bud that is in good condition. This can be done simply by tying a splint to the main trunk so that it extends beyond the bud or to a side branch that is to be saved. As the new top develops, it should be carefully tied with soft twine or "twist-ems" to the splint to form a straight top. The splint should be removed after the new growth has hardened off in late fall.

Injury to junipers seems to be greatest in the Chinese varieties, including the Pfitzer and some of the upright varieties. Little or no damage has been observed in the prostrate, or creeping, types. The "Tammy" juniper, *Juniperus sabina tamariscifolia* Ait., escaped injury in most areas. Where injury occurred it was usually in isolated small branches. Many of these were not as a result of the freeze but more as a result of minor breakage from the weight of the snow.

Disease Incidence High

As was predicted earlier, the incidence of disease, particularly the canker-type diseases, is much higher than normal. Diseases such as cytospora canker were very prevalent in cottonwood and willows. This is a result of the freeze causing cracks in the bark of trees, thus exposing the vulnerable tissues beneath. In some cases, cottonwoods and willows were so heavily covered with the cytospora canker that the branches appeared to be velvety red orange in color. The coloration comes from the sport or fruiting bodies of the canker disease.

The amount of fire blight in crab-apples, domestic apples and mountain ash was also high despite the fact that many of them did not flower this year. Normally, in a flowering year we can expect fire blight to be high simply because the disease enters through the flowers when transmitted by honey bees and other insects. It is believed that the damage seen this year on non-flowering branches is a result of the bacterium being washed or blown into freeze-caused cracks in the bark. The disease, as in cytospora canker, enters through any open wounds in the tree.

Dutch Elm Disease Threat High

The most serious problem arising from the freeze is a bewildering amount of dead or dying elm wood which is now most certain to become a target for the European elm bark beetle. The progress of Dutch elm disease in the Denver metropolitan area, now in its apparent second year, has been declared to be of epidemic proportions. October's storm will most certainly contribute to this problem and it will require an intensive community-wide sanitation and selective chemical spray program to stem the spread of this dread disease.

Disposal of elm wood, in fact any

kind of tree logs, is now an acute problem. Municipal dumps in many areas are becoming piled high with quantities of tree logs and limbs, and these in themselves are now breeding sites for the European elm bark beetle and sources for the further spread of the disease. It is hoped that these areas can be promptly cleaned up before the next beetle hatch, which occurs in late summer.

You as an individual citizen can help by first seeing to it that you have

cleaned up all of your property and disposed of all elm logs to which bark is still firmly attached. Any elm branches two inches in diameter or greater present a serious hazard in the spread of Dutch elm disease. You can also help by supporting your community in local clean-up campaigns.

Don't take your trees for granted. Trees in a community are a definite and valuable asset. You should do everything you can to protect them from destruction.



Do You Have Thyme?

SUZANNE ASH

"WHAT GROUND cover do you have that will grow fast on a dry slope?" This question is constantly asked of the personnel at the Rock Garden booth at the annual Plant Sale.

Plant problems that confront us are seldom easy, but one group of plants fills these needs and, unfortunately, is often overlooked by all but herb gardeners. Thyme, with its many varieties, is an excellent seasoning but is an equally valuable rock plant. It grows anywhere and requires no care. New plantings, of course, require water until they are established.

The bloom is insignificant but the foliage color and texture are not! Even in winter, the russet tones create interesting patterns among the rocks. Thyme forms a very tight, compact mound, is excellent for combating erosion and

yet, it is not invasive as are some ground covers.

The varieties I have grown and found successful under these conditions are:

Thymus serpyllum, Mother-of-thyme, fragrant, pink flowers. 3-4 inches.

Thymus s. aureus, golden thyme, variegated foliage, lemon-scented, part shade if the golden color is to predominate. In full sun foliage will be green. 3-4 inches.

Thymus s. lanuginosus, wooly thyme, nice texture, pink flowers. 2-3 inches.

Thymus s. coccineus, crimson flowers, hardy. 2-3 inches.

The next time you shop for rock garden plants, I hope you'll take THYME!

PROGRESS! *in the Gardens*

A. R. KNAUER

PHASE I in the reconstruction of the gardens is under way! On September 15th the plans for this project underwent a final review by the Denver Botanic Gardens Board of Trustees, and resolutions were passed authorizing immediate execution of a contract with the firm of Langfur Construction Corporation for the actual work and with Wright McLaughlin Engineers for supervision, inspection and construction administration. On September 28th construction on this long-awaited step in the garden development began.

The scope of this work entails regrading of almost all of the land between the parking area by Botanic Gardens House to the Conservatory, and from the east fence at York street to the west fence at Cheesman Park. Elevations will change as much as ten feet in this area. In addition to the grading, an extensive network of water conduits designed to provide a frost-free source of water to every portion of the garden will be installed. Probably the most significant aspect of this project will be the complete installation of the decorative waterways which form the backbone of the entire garden.

The waterways, a major feature of the Master Plan as designed by Eckbo Dean Austin and Williams arise from fountain heads in tall pylons near the present herb garden, flow into an upper lake there and subsequently via various cascades, shoots, waterfalls and auxillary fountains, through lower lakes, into an informal natural channel in the Japanese garden, then eventually into the present Gates pool. At this point the water will be picked up by a large recirculation pump and returned to the pylons in the upper lake. The water ways will not only provide a visually pleasing aspect but the entire garden will be within the delightful pale of sound created by running water.

The first big step has been taken toward the long awaited realization of the magnificent plan conceived by the landscape architects working with the Planning and Executive Committees, the Board of Trustees, the staff and many other interested groups and individuals.

Efforts of those dedicated individuals directing the Denver Botanic Gardens Development Fund Drive have now been redoubled. Together with the Board of Trustees they are determined

to reach the minimum goal of \$850,000 so that all steps through the completion of the entire garden may be taken in an orderly fashion. At present the Fund Drive totals over \$650,000.00 in pledges and cash.

The Education Building

Scheduled for completion late in 1970, the Education Building, designed by Hornbein & White Architects, has been a subject of amazement to all who enter the unfinished structure. Appearing very small from the outside (seemingly dwarfed by the Conservatory) the structure "opens up" amazingly on entering. Over 20,000 square feet of floor space is available for a multiplicity of educational functions. The main room, called "Horticultural Hall," will comfortably seat over 400 persons or contain flower shows of any scale. The library contains shelf space ade-

quate to more than triple the present book collection and has provisions to double even that in a lower level. A generous stage, storage, preparation room, lounge, walk-in cooler and beautiful garden court completes the first floor room arrangements. Below, at the garden level, three generous classrooms, a large storage area, mechanical room, a special Gift Shop storage room, dark room and research laboratory occupy most of the area with the library expansion area comprising the remainder.

On a partial second floor there is a special display area on a balcony overlooking the garden court, and a large herbarium room and projection booth which opens into Horticulture Hall.

The day of opening, not far off, is eagerly awaited by all. Prepare yourself for a real treat and plan to visit early in 1971.



Exotics of Colorado...

Pyracantha

DR. HELEN MARSH ZEINER

NOT MANY years ago the shrub *Pyracantha* Roem. or firethorn was a novelty in Denver; the bright orange-red fruits are now a familiar sight during the fall and early winter.

When this author first joined a garden club in Denver, about twenty years

ago, very few members were trying to grow *Pyracantha* because it simply was not hardy and seldom survived for any length of time. At that time one member of the club had a very durable pyracantha bush, and she kindly brought cuttings for others to try. In

ways such as this, in addition to the efforts of local nurserymen, hardier varieties have been introduced and many pyracanthas are now growing quite well in protected locations in Denver.

There are six species of *Pyracantha*, all from southeastern Europe to the Himalayas and Central China, plus numerous horticultural varieties. It is easy to understand why some pyracanthas are hardier than others. *Pyracantha coccinea lalandii* Dipp., Laland firethorn, seems to be a sturdy form which will endure here. However, if you are interested in a pyracantha, it is suggested that you patronize a local nurseryman who is in a position to know which varieties are suitable for this area.

Pyracantha is grown primarily for its attractive orange-red fruits which hang on well into the winter, usually until they are eaten by birds. The shrub is classed as a broad-leaved evergreen with dark green, glossy leaves. If the winters are too cold, the leaves may turn bronze and drop off. Tender varieties may winterkill to the ground.

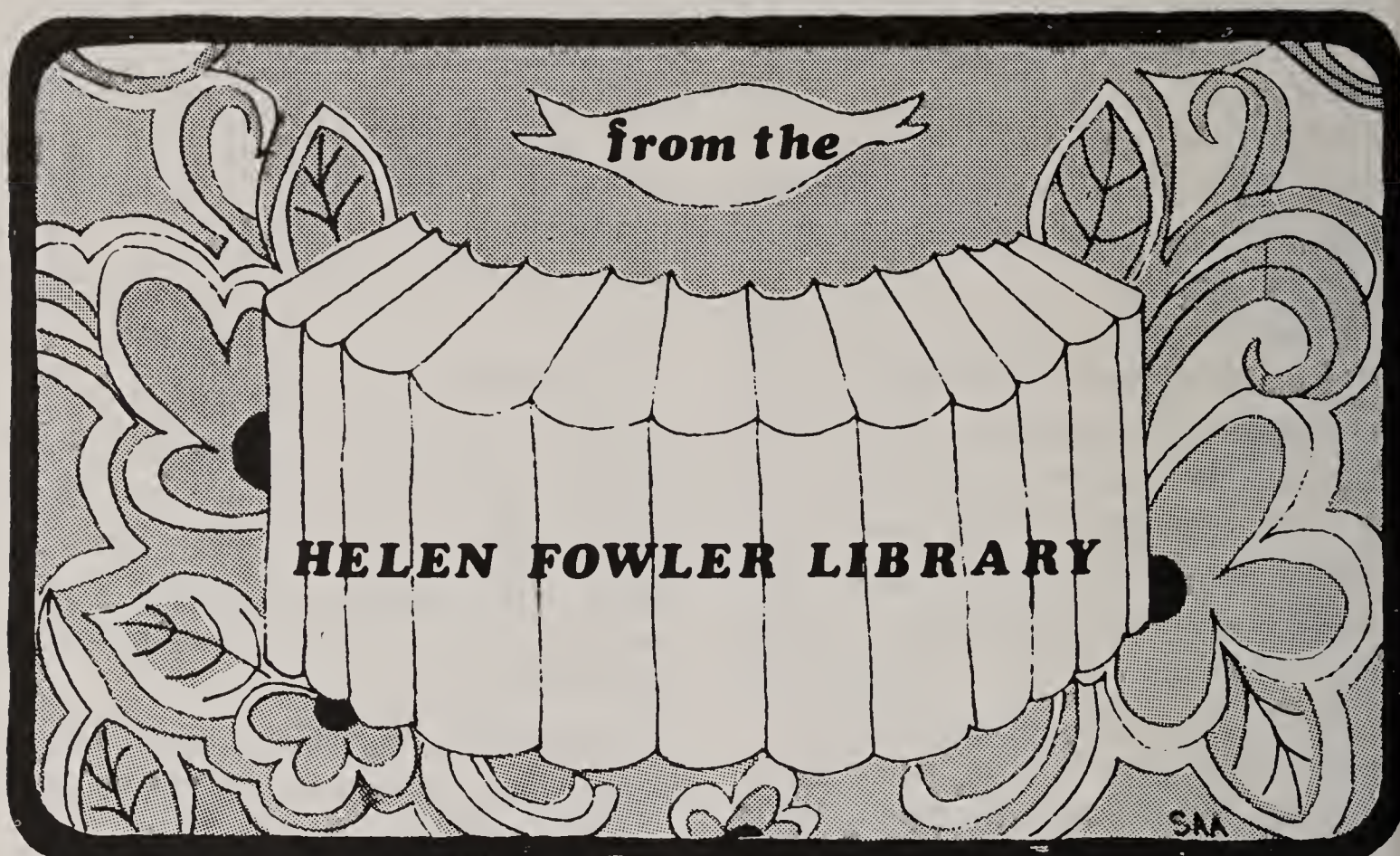
Pyracantha is a member of *Rosaceae*, the rose family. Examination of the fruits will show that they resemble tiny apples. They are, botanically speaking, the same type of fruit — a pome. The white flowers borne in compound corymbs (a type of flat-topped cluster) resemble those of many other members of the rose family. They are sometimes described as miniature white wild roses.

The name *Pyracantha* comes from two Greek words, "pyr" meaning fire and "acanthos" meaning thorn. Thus the name alludes to the bright orange-

red fruit and to the spiny branches. *Pyracantha* is an example of a genus name that is also used as a common name. The name firethorn is simply a translation of the genus name. Firey thorn and everlasting thorn are occasionally used as common names.

Pyracantha is often recommended in the literature for use in a shrub border or as a high hedge, but here it does well trained on a wall or a building which gives it extra protection. It appears as an evergreen vine when handled in this way.

Legends often spring up about plants which have been cultivated from very early times. This is true of *Pyracantha*. A very old French legend explains the origin of this shrub. According to this legend, an unhappy tree-sprite who lived in a hawthorn tree wanted to be free to wander through the forest. At last the tree gods granted his wish, but he became a green wolf whenever he left the hawthorn. In this same land a donkey went from one monastery to another, carrying messages and parcels. One day the green wolf met and ate the donkey. Just then a monk came along, saw the green wolf whom he believed to be the devil in disguise, and held up his cross. At the sight of the cross the green wolf repented and offered to take the donkey's place. One day, while conscientiously carrying out his duties, he was trapped in a forest fire. When he escaped, half of his green fur was flaming red. At this instant the tree gods changed him into a bush with green leaves and flame red berries, and also with thorns to remind him of the hawthorn tree where he had lived as a tree-sprite. Thus, so the legend says, the firethorn came into being.



MANY MEMBERS of Denver Botanic Gardens and visitors inquire, "Who was Helen K. Fowler for whom the library is named?" Mrs. Fowler (1879-1960) and her husband, John, were widely known landscape gardeners and owners of Shadow Valley Gardens, a large nursery in Wheat Ridge, Colorado. Active members of the Colorado Forestry and Horticulture Association, they were devoted to the horticultural development of Colorado. In 1947 the president of the association, Mrs. John Evans, provided a headquarters building called Horticulture House at 1355 Bannock Street in Denver. Without a ready reference library, it was impossible to make available authoritative information for the varied inquiries which arose daily. By this time Mrs. Fowler had made and secured donations and books to establish a horticultural library for the Colorado Forestry and Horticulture Association.

In Horticulture House book shelves were built, also some card files and a typewriter were obtained thru the generosity of the association members. Helen Fowler donated her own collec-

tion of five hundred books, and continued with her untiring efforts to encourage others to help assemble a library. In March of 1948, at the annual dinner of the Colorado Forestry and Horticulture Association, it was announced that the library at Horticulture House had been named The Helen Fowler Library to honor Mrs. Fowler whose generosity and vision made the library possible. Mrs. Fowler was also given the honorary title of Librarian, since she and others who operated the library were untrained as qualified librarians. She kept the members informed of new library acquisitions by regularly submitting book reviews for publication in *The Green Thumb*. By 1951 the library contained over 2,300 volumes.

With the merging of the Colorado Forestry and Horticulture Association and the Denver Botanic Gardens in 1960, new headquarters became available at 909 York Street, in Denver. Dr. and Mrs. James J. Waring had donated, in memory of Henry M. Porter, the present administration building adjacent to the Denver Botanic Gardens

testing grounds and now known as Botanic Gardens House. A large library room with built-in book shelves was already available. In this location the Helen Fowler Library has become one of the Botanic Gardens' most valuable assets.

As Director of Denver Botanic Gardens, Dr. A. C. Hildreth made available a limited portion of the annual budget for the library; however there were still no funds for a salaried professional librarian. Nevertheless, the Helen Fowler Library continues to increase in size and usefulness, thanks to all those who share their knowledge, books, funds and countless hours of volunteer service. The library is a source of reliable information for the Gardens' staff, association members, students and researchers, public parks and forest officials, landscape architects, as well as many home gardeners. Each year more high school and college students draw on reference sources not available elsewhere.

The library encompasses literature in the fields of botany, horticulture, forestry, agriculture and subjects necessarily interrelated. Now containing well over 5,000 books, 100 current periodicals and a large pamphlet file, the Helen Fowler Library is recognized as a most outstanding collection of its kind. The list of generous library donors who have contributed toward this goal is legion. A five-volume collection

of 197 water colors of Colorado wild flowers by Emma Armstrong Ervin (1874-1957) is on permanent display here. A rare and unusual collection of books, which includes limited, autographed and out-of-print editions, is kept in a specially constructed case donated by Mrs. Alexander Barbour, a devoted friend to the library. The Denver Botanic Gardens Guild prepared and presented a large volume of dried, mounted and classified herbs accompanied by a descriptive text. A fine collection of books on cacti was acquired through the generosity of the Colorado Cactophiles. More recently, Dr. D. W. Mitchel donated a large part of his valuable library of mycology, adding substantially to the library's research literature. Since the opening of the Boettcher Memorial Conservatory, the collection has grown to include a wide selection of literature on tropical plants and flora of the world. The popularity of the Childrens' Garden has also necessitated enlarging the collection of texts for the younger generation.

The future of the Helen Fowler Library appears even brighter in the new Education Building, adjoining the Conservatory. The library will continue to grow, keeping abreast with literature on the newest techniques, discoveries and developments in botany and allied sciences and arts. In fact, the "growing season" is continuous in the Helen Fowler Library.

EDITH WILSON

Beyond The Aspen Grove

ANN ZWINGER

Random House, N.Y. 1970

Coming at a time when we are all being made aware of ecology and its importance in our lives, *Beyond the Aspen Grove* is a most significant book.

It all began seven years ago when the Zwingers purchased 40 acres of

mountain land with which Mrs. Zwinger became completely enchanted and about which she has learned a great deal. We are fortunate that she has chosen to share her knowledge with us by writing *Beyond the Aspen Grove*.

Beyond the Aspen Grove describes an area of varied habitat as seen through the observant eyes of an artist with a true love of nature, curiosity, and a great deal of insight into the relationships of all living things. It is natural history at its best.

The book conveys a wealth of good information in a manner which even the most uninitiated can understand. It should inspire interested nonprofessional persons to learn about their environment; for Mrs. Zwinger, who learned so much about the land and all the life upon it, was in the beginning an artist by training and a layman ecology-wise.

Beyond the Aspen Grove is a book for leisurely reading so that one can savor every word. Not only is Ann Zwinger an artist with a brush, she is

also an artist with words. Her descriptions are truly exquisite. The book is also full of unexpected and delightful bits of humor which the hasty reader might miss.

The many beautiful drawings are artist's drawings, and they do not always depict with the 100% fidelity of the true scientific illustration (nor were they intended to). The artist, however, has a feeling for the objects drawn and the drawings always catch the true character of the plant or animal. Anyone could identify plants or animals from these drawings, and they add a great deal to the beauty and to the usefulness of the book.

Beyond the Aspen Grove is a delightful book in every way and it is a "must" for all interested in the mountains and in nature.

— DR. HELEN MARSH ZEINER

A Treasury of American Indian Herbs

VIRGINIA SCULLY

Crown Publishers, N.Y. 1970

A Treasury of American Indian Herbs; Their Lore and Their Use for Food, Drugs, and Medicine. By Virginia Scully; Crown Publishers, Inc. New York, 1970 \$6.95

Inspired by the plants growing around her Wyoming ranch home and with an acute awareness of the Indian's herbal knowledge, Mrs. Scully has compiled a record of the uses of the plants and herbs of the Rocky Mountain region.

Knowing a daisy from a columbine, but not an *Erigeron* from an *Aquilegia*, as a first step she purchased M. Walter Pesman's *Meet the Natives* and began her research at Denver Botanic Gardens' Helen Fowler Library. She traveled by bus to interview Indians and descendants of pioneers. From libraries and historical societies she compiled much information.

In the first half of the book plants are listed alphabetically from Absinthe to Yucca as used for food and drink by the Indians. In the second half the herbal uses for maladies and in medicines are given.

Botanical names are used only when necessary for clarification. This decision may upset scientific minds.

The bibliography is extensive. Illustrations are from Gerard's *Herbal* (1636) and Dr. W. Beach's *The American Practice Condensed* (1849).

This herbal will impress the reader who views nature as an organic whole and who respects the Indians' reverence for working with nature instead of against her. — MBN

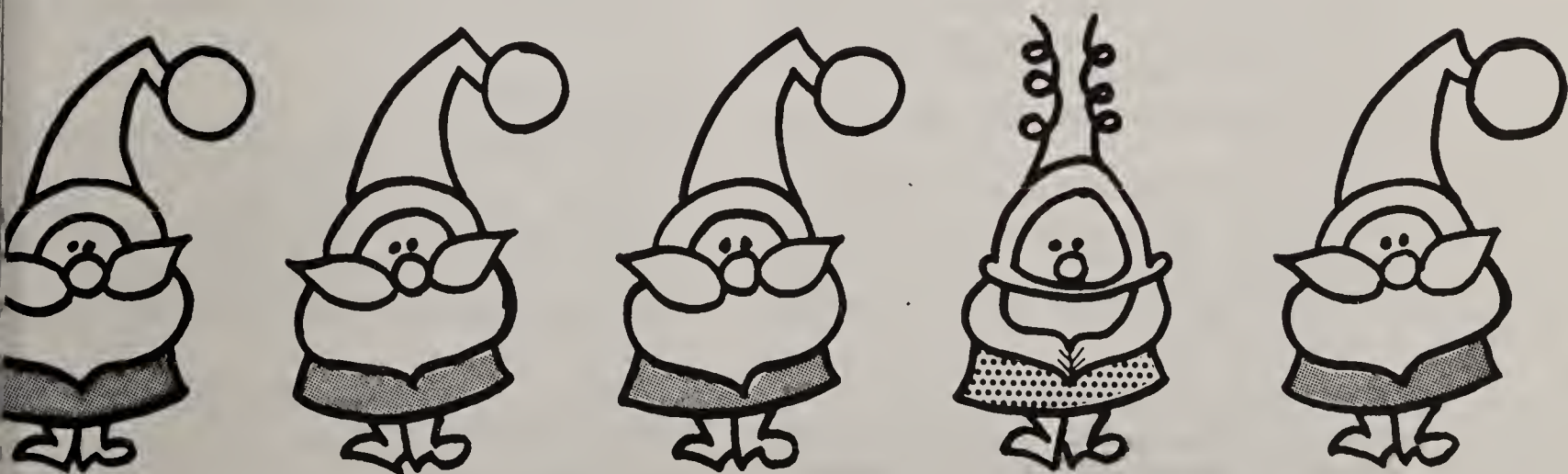
Note: Pesman's *Meet the Natives*, published by Denver Botanic Gardens, and *A Treasury of American Indian Herbs* are also available in the Conservatory Gift Shop.

DENVER BOTANIC GARDENS

CHRISTMAS SALE

November 20 & 21 • 10:00 a.m to 4:30 p.m.

for that something different



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The Green Thumb

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Botanic Gardens House

DENVER BOTANIC GARDENS

DENVER, COLORADO

This is a non-profit organization supported by municipal and private funds.

A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden center around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

